

The Iron Age

A Review of the Hardware and Metal Trades.

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The Warner Process.

Mr. Arthur Warner, in a letter concerning his new process for refining iron, gives the following description of the plan and method of operation:

The desirability of removing silicon, sulphur, and phosphorus from pig iron intended for puddling, is known to all those in the iron trade; and any process that can be proved to remove these impurities, or any of them, at a sufficiently low price, is sure to be regarded with interest. The process I am about to describe is the result of several years of investigation at some experimental works I erected for the purpose, and where I operated upon 2½ to 3½ tons of iron at a time. The iron was melted in a cupola and then tapped into a deep wrought iron receiver lined with fire-bricks, at the bottom of which were placed the ingredients intended to act upon the iron.

It is well known that oxide of iron, limestone, and many other substances are capable of extracting silicon from molten iron and combining with it to form a slag; and it would be evident to any one that the most effectual mode of making them act, would be to cause them to permeate the body of molten iron in a finely divided state. I found, however, that when such infusible materials were placed at the bottom of the receiver and the molten metal poured upon them, the materials remained at the bottom and the iron above it unacted upon; but when I mixed with these inactive materials a substance, such as soda ash, that is easily fusible at the heat of molten iron, the particles of limestone were separated by the melting of the soda ash, and caused to float up through the metal in such a manner that they acted upon every part of it. And the taller the column of iron acted upon the more economically could the process be carried out; because if the purifying action of the materials were not exhausted by passing through 3 ft. of molten iron, they would be able to purify 2 ft. or 3 ft. more if they had that extra depth to traverse, and by taking the molten iron direct from the blast furnace the expense of melting in the cupola is dispensed with. When it is desired to remove sulphur as well as silicon, limestone is the most efficacious material, but when sulphur is not present in objectionable quantities, oxide of iron is the best to use, as it increases the weight of iron operated upon and is cheaper than most other substances. The fusible material I have chiefly employed has been soda ash, but chloride of calcium and several other salts are cheaper and probably quite as effective.

There are many ways of arranging the plant, but the one shown in the sketch by which this description is accompanied, I consider to be the best for those works where it can be carried out. The pig bed is divided up the center by a channel sunk as far as practicable below the level of the blast furnace tapping hole. A chimney is placed at the end of this channel supported on iron columns or brick piers, so that the receiver can be run under it. The joint between the two can be made secure by dropping a ring over it and filling it in with loam sand. If sufficient depth could be obtained one of the slag roads might be utilized, instead of dividing the pig bed up the center. Should this plan be inapplicable at some works a pit may be sunk and the receiver lifted in and out by a hydraulic or steam crane, or the receiver rails may run below the level of the rails at the bottom of the pig bed, by building up a low wall on each side of the channel and bridging it over with two light girders that could be swung on one side when the receiver had to pass.

The receiver is charged with limestone and soda ash, finely ground and intimately mixed in the proportions of 40 lb. of each to every 1 per cent. of silicon that it is desired to remove from one ton of iron, supposing the metal to be about 3 ft. 6 in. deep. This charging can be done in a shed at a distance from the pig bed, the purifying materials being simply placed at the bottom. The receiver is then run under the chimney and the iron tapped in. A violent commotion begins almost immediately, caused by the generation of carbonic acid from the limestone. This is converted into carbonic oxide by the oxidation of the silicon, and burns at the top of the chimney with a brilliant flame. The lime and soda combine with the silicon and sulphur and form with them two separate slags that float on the surface of the iron and keep it hot; the sulphides standing above and quite distinct from the silicates. When the agitation, which lasts from 20 to 30 minutes, has subsided, the ring of communication with the chimney is raised, and the receiver drawn away from the chimney to a separate pig bed, where it is tapped into iron molds, and is then ready for puddling. The slag, quite free from iron, then follows, and the receiver is ready for a fresh charge.

The refined metal is quite white and free from silicon and sulphur, and the carbon is unacted upon, unless the mixture has been slightly altered for the purpose of removing or

adding to it; and it is in this peculiarity that consists the great advantage of this system over the old one. In order to obtain a good quality of wrought iron, the metal must melt fluid in the puddling furnace, so as to avoid any raw particles in the bar, whilst, at the same time, it should be free from sulphur, which makes it red short, and from silicon, which, beside wasting coal, labor and fettling, causes the iron to be too long in the furnace, and so dilutes the purifying flux of hammer slag, that it runs out at the stopper hole and does not remove the phosphorus. Pig, or unrefined iron, melts thin enough, but it contains a large quantity of silicon; this can be removed by the old refinery, but then the carbon is also reduced, and consequently the iron becomes too difficult to melt; sulphur is at the same time frequently added from the coke. My process is the only one I am aware of that will remove the silicon and sulphur without the carbon.

Thirteen analyses show the regularity of the process, and how completely it is under con-

periments have shown that the best composition is silicon below 0.35 per cent., sulphur below 0.05 per cent., carbon 2 per cent. If there is more carbon it takes too long to puddle, and if there is much less it does not melt liquid enough. When, however, a superior class of iron is puddled, containing, say, 0.50 to 0.80 per cent. of phosphorus, a larger proportion of carbon is necessary to melt the iron sufficiently thin. An analysis by Mr. Riley, of cold blast iron refined at the Kirkstall forge, shows phosphorus 0.280 and 3.452 per cent. This can be puddled in a Dandy furnace in 50 to 55 minutes per heat. Were Cleveland iron to contain this quantity of carbon it could not be puddled in less than two hours in an ordinary furnace, even if no silicon were present.

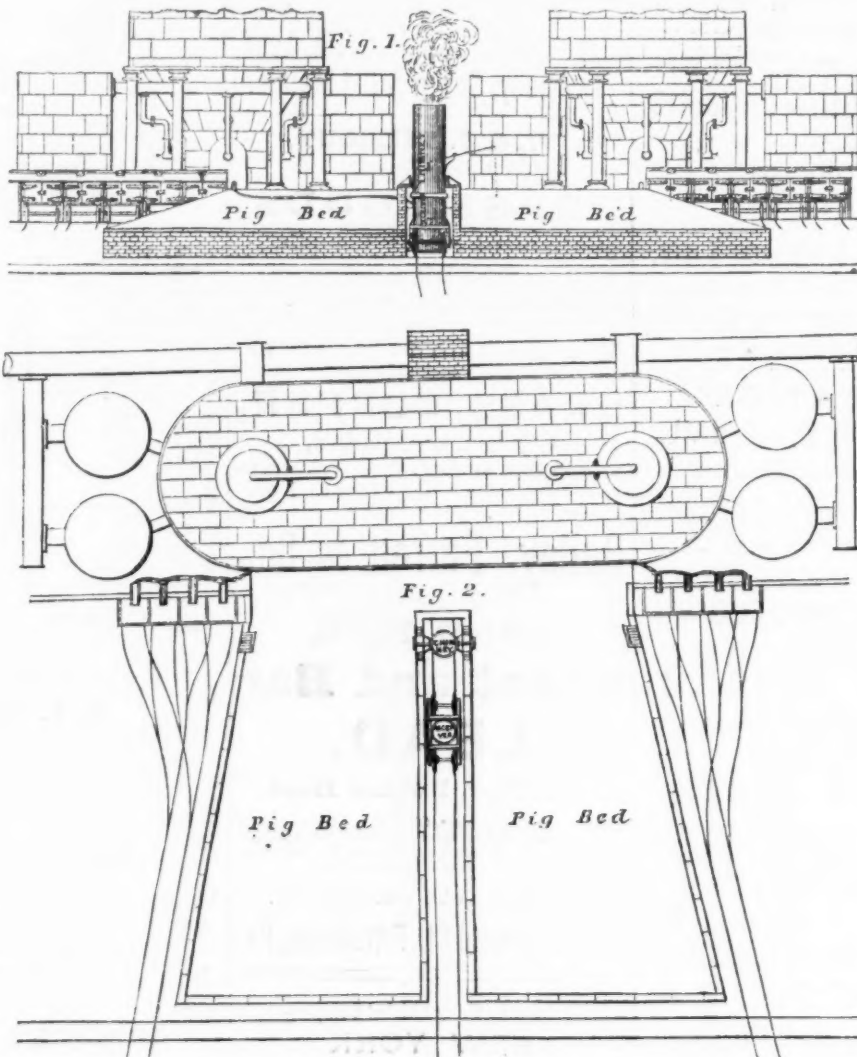
The advantages to the puddler in using such a refined iron are:

1. It takes about 70 minutes per heat to puddle in an ordinary furnace, or 50 in a Dandy furnace, where there is a preparatory heating oven. This shows the great advantage of the latter, which is generally used in South York-

villages and churches. Our American cousins are but human, even as we are human. Nay, the people who can eat and drink and talk and rhyme, in honor of their own exploits, without offending neighbors and rivals, have not yet been found on this poor earth.

A hundred years of growth, of produce, of invention—this is what America will show the world, and this will interest men of every race; but none so greatly as ourselves, who planted these amazing colonies on a distant shore, as we are planting colonies now on every continent of the globe.

It is a splendid tale they have to tell. When John Hancock and his fellows signed the Declaration of Independence, thirteen colonies were represented in Congress, and these thirteen colonies counted a mere handful of people. In a hundred years, we have fifty States and territories, covering three million square miles of surface, and containing nearly forty millions of inhabitants. England excepted, no country has increased so fast in territory and in population as the United States.



PLANT FOR WARNER'S PROCESS OF REFINING PIG IRON.

trol; and as there is no perceptible difference in puddling the iron whether it contains 0.35 or 0.03 of silicon, and as the iron cannot be over-blown (or over-refined) by this process, like it can by the old one, the slight variations in the iron that comes from the blast furnace are of no consequence, because its removal within the above limits may be always ensured by using sufficient material.

The following analyses, by Mr. Pattinson, will show the results of the three last days I refined at my experimental works, and were from mixed lots of iron, the composition of which had to be guessed, and they will give a very good idea of the results to be obtained at the blast furnace. It will be noticed how closely the averages of each day correspond:

No. of Cast.	February 13, 1874, each lot 2½ tons.	February 17, 1874, each lot 2½ tons.	February 19, 1874, each lot 3 tons.
1st cast	Silicon, Sulphur.	Silicon, Sulphur.	Silicon, Sulphur.
2d "	0.22 0.07	0.07 0.05	0.05 0.05
3d "	0.22 0.06	0.06 0.05	0.05 0.05
4th "	0.11 0.05	0.25 0.02	0.02 0.02
5th "	0.03 0.01	0.11 0.03	0.13 0.03
6th "	0.15 0.02	0.02 0.02	0.04 0.04
Average analysis of each day.	0.14	0.10	0.12

The sulphur I had always found so low that I did not have it analyzed on the last two days. When a common iron containing, say, 1½ per cent. of phosphorus, has to be puddled, my ex-

perience, where they puddle refined iron for best purposes, and make 10 heats per shift of 9 hours.

2. It needs hardly any fettling and less repairs to furnace.
3. No scraps are required for the bottom of the furnace.
4. A greater yield of puddled bars is obtained from the same weight of pig iron than is now done.
5. There is a great yield at the mill, and consequently the same plant would turn out a great deal more iron per week than it now does.
6. The regular character of the metal would avoid many disputes with the puddlers, and the quality of the wrought iron produced would be superior.

An English View of the Centennial.

Mr. W. Hepworth Dixon, writing from Philadelphia to the *Sheffield Independent*, says:

That a great nation should celebrate her advent is a thing of course; that she should celebrate the fact in a modest, inoffensive manner, is an accident of taste. Such acts are always selfish acts, conducted under auspices to bring out pride of speech. Who can be warm and wise, excited and sedate? Think of our birth days, our majorities, our silver weddings; are they always modest and without offence? Are not our family feasts, our village anniversaries, even our church gatherings, made occasions for a little vanity in the doings of our noble selves? Nations are only groups of families,

France and Spain have shrunk in territory, and have hardly gained in population. Austria has been rent asunder; Italy has become united, and her growth has been promoted by her freedom. Prussia has started up into mighty power; and her external growth is more remarkable than that of the American republic, but her sweep of territory has not been commensurate with her increase in military strength. Russia has made enormous strides, and is now the second country of the earth. England has outgrown every rival, having a larger territory than Russia, and a population second only to China. But the States are treading in our foot steps, and assuming their inheritance in the soil.

In a hundred years, America claims, and justly claims, her share in the inventions which have done most to serve mankind. Even after striking out her claims to the invention of steam ships and electric wires, the list of her inventions, or improvements on inventions, is considerable. An American invented the cotton gin. An American invented the rotary printing press. The apple parer and the knife cleaner are American. The grass cutter, the steam mower, and the planing machine are all American. Is not the hot-air engine American? Are not the various sewing machines American? The India rubber business is American. One American taught us how to make wool cards, another how to make horse shoes by machinery. The sand-blast is American; the grain elevator is American. Americans claim the electromagnet, and the artificial manufacture of ice.

The people are of a skillful race, and there are probably hundreds of inventions lying in the lonely farmsteads, waiting for a little daylight, such as they will find in Fairmount Park.

Apart from other nations, the Americans would have formed a rich and singular collection, picturing their country to the eye on a most ample canvas and in a befitting frame.

A New Enameling Process.

Mr. J. H. Robinson, of Liverpool, England, has recently invented a process which, he claims, is not only cheaper, but in which the resulting product is free from those specks of dirt which seem inseparable from the present methods of manufacture. The new process yields enamels of sufficient purity for dials and similar work, and is not so expensive as to virtually prohibit its use for ordinary purposes, such as name plates, notice boards and wall advertisements. Thin sheet iron is first cut and stamped to the desired shape, the edges of the plate being turned up slightly the usual way, so as to form a shallow tray, the edge serving to hold the enamel in position during the preliminary stages of the process. The plate is then to be made chemically clean by any of the ordinary processes of picking and scouring. The ingredients of the enamel should be taken in the following proportions, but in some cases or for certain purposes, they might be slightly varied: White lead, 12 ozs.; arsenic, 2½ cza.; flint glass, 8 ozs.; saltpeter, 3 ozs.; borax, 6½ ozs., and ground flint, 2 ozs. These are to be powdered and mixed thoroughly, placed in the crucible and fused; but before they are cooled they must be plunged into cold water, which has the effect of rendering the mass very brittle. The cakes of fused enamel are then pounded to about the fineness of coarse sand, washed and dried. The powder is then ready for use. The plates of sheet iron, having been well cleansed and thoroughly dried, are sprinkled over with sufficient enamel powder to make the coating of the desired thickness, and are then placed in a muffle, the turned up edges retaining the swelling enamel in position. Lettering or designs can be produced on the surface by the ordinary means; but if it is desired to put them on when the enameled plate is cold, they are first received on paper, an impression being taken in soft black enamel from the engraved plate, and subsequently transferred, the article being again placed in the muffle to fuse the enamel of the design or letters. The inventor claims that the iron back is more durable than copper, and it certainly is cheaper. Variations in color of the enamel can, of course, be obtained by the addition of various salts and earths, such as those of cobalt, peroxide of manganese, protoxide of iron, etc., and similar diversity of color can be introduced into the design or the letters.

Fireless Locomotives.

A correspondent of the *Times*, writing from New Orleans, La., says: Fireless locomotives are in constant and successful operation on a city and suburban railway in New Orleans, namely, the New Orleans and Carrollton Railway, under the able management of Gen. G. T. Beauregard, who is a skillful engineer, and yet who is alive to, and keeps pace with, the improvements of the age. This success has been achieved, too, under the most adverse and unpromising circumstances. The road under other running arrangements had become nearly valueless, its stock having gone down to seven cents; but it is now a paying and valuable road.

The road is about six miles in length. From the center to the outskirts of the city it is operated by mule-power; there the mule is taken from the car and the little fireless locomotive is attached, which is accomplished in less time than would be occupied in attaching another mule. The train is then off like a rocket, the driver still on the platform of the car working the engine, managing the brakes, and making change, as usual; there is no other person on the train to attend to these duties. The car is started and stopped quicker than when drawn by the mule. The railway (double track) is in the middle of a very wide street, and is a little raised, so that it cannot be crossed by carriages except at the street crossings; thus, being somewhat isolated, high speed is admissible.

The locomotive is simply a cylinder of boiler iron, perhaps three feet in diameter and ten feet long, mounted on four wheels and partly filled with water. The engine (a double vertical) is attached to the end of the cylinder next the car, being within reach of the driver. The cylinder is then filled with steam at a proper pressure, from a stationary boiler at Carrollton, when the locomotive is ready, and it will run to the city and back without care or expense. There is no fire, no ashes, no pump, no danger, and less noise than from the hoofs of horses. The expense of this means of propulsion, Gen. Beauregard assured me, is less than by mules. The cost of the locomotives is \$1250 each, which includes the builder's profit.

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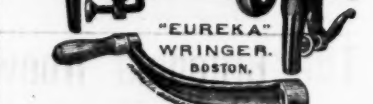
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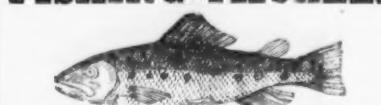


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New Patents.

We take from the records of the Patent Office
at Washington the following specifications of
certain patents lately issued, which will be
found interesting:

IMPROVEMENT IN TEMPERING STEEL PLATES.
Specification forming part of Letters Patent
No. 159,652, dated February 9, 1875, issued to
Henry Diston and Charles T. Shoemaker, of
Philadelphia, Pa.

The object of this invention is to rapidly and
effectually harden or temper saw blades and
other objects of steel by causing them to tra-
verse down a flue, through which the products
of combustion pass from a furnace to a chim-
ney.

In the accompanying drawing, Figure 1 is a
vertical section of the apparatus, and Fig. 2 a
transverse section.

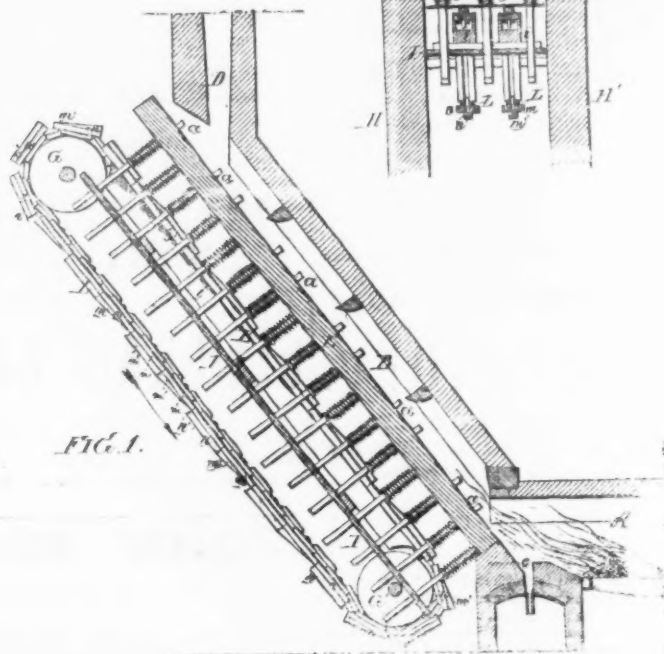
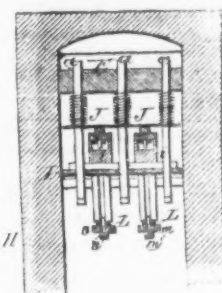
A is a furnace, from which an inclined flue,
B, extends to a chimney, D, the said flue being
formed by a partition, E, between the walls H
H', which are continuations of the side walls of
the furnace. A series of rods, a, pass through
the partition E, and are guided by a plate, I,

poor be placed on steel rails (\$5. 10 / per ton),
for the purpose of enabling Russian rail makers
to compete with foreign made steel rails. The
railway department have already ordered steel
rails to be made in the country at two roubles
30 kopek a poof (£20 per ton), and intend to
give out further orders at same price, as soon
as the imperial sanction is given to the duty
being levied." We may add at present moment
the duty on steel rails is 50 kopek per poof (£4.
2 6 per ton), but the department of railways
continually give to constructors permission to
import duty free. The Exchange Gazette, writ-
ing on this subject says: "The object in view
(by placing a heavy duty on steel rails) is to
enable the country in time of war to pro-
vide rails required for remount of the 20,000
versts lines now working (actually 19,537
versts), and the 6000 versts railways building,
and that the object is a laudable one, commend-
ing itself to every Russian patriot."

Matters at Joliet.

The Joliet (Ill.) Republican says:
The operation of the blast furnaces, which

FIG. 2.



IMPROVED APPARATUS FOR TEMPERING STEEL PLATES.

built into the side walls H H'. The rods are
arranged in sets of three in the present in-
stance, as shown in Fig. 2, and the three rods
of each set are secured to a bar, J, between
which and the partition E intervene a series of
spiral springs, one spring surrounding each
rod, the springs having a tendency to retract
the rods a from the flue, as explained hereafter.
G and G' are two pairs of chain pulleys, one or
both pairs being so driven as to cause two en-
less chains, L L', to traverse in the direction
of the arrow. To the links of the chain are se-
cured a series of plates, m n, each plate m hav-
ing an inclined rib, m', and each plate n having
a straight rib, n'. The plates m and n are ar-
ranged alternately throughout the endless chain,
and the deepest portion of the inclined rib of
one link, m, coincides with the straight rib n'
of the adjoining link n.

It will be observed, on reference to Fig. 1,
that the highest set of rods a project into the
flue, as they are under the control of the
straight ribbed plates n' of the endless chains,
the plates traversing in contact with perma-
nent ways i, best observed in Fig. 2. While
the highest rods are in this condition a saw-
blade is introduced into the top of the flue B,
placed on the inclined partition E, and per-
mitted to rest with its edge against the pro-
jecting pins, and here it will remain until, as
the endless chain traverses in the direction of
the arrow, the highest rods are free from the
control of the straight-ribbed links, when the
said highest rods a will recede from the flue B
and release the saw-blade, which will slide
down the partition E until it reaches the next
set of pins, by which the blade will be retained
for a short time until released.

Thus blade after blade is introduced into the
flue, and is caused to traverse intermittently
down the inclined partition E, each blade, af-
ter being released by the lowest set of pins a,
being permitted to fall through an opening, c,
into a cistern or reservoir containing hardening
liquid.

It will be observed that each blade, as it
passes down the inclined partition, is subjected
to a constantly increasing temperature until it
is discharged at the proper heat for being
hardened by immersion. This plan of subject-
ing the blades to a gradually increasing tem-
perature before immersion prevents undue
warping of the said blades.

Claim.—1. The flue B, communicating at one
end with a chimney and at the other end with a
furnace, in combination with retaining and re-
leasing rods a, a, caused to project into and to
recede from the flue.

2. The combination of the inclined flue B,
the spring rods a, and the endless chain with
its ribbed plates m and n.

Russian Import Duty on Steel Rails.

The St. Petersburg Financial Review of Feb.
13, says: "In the Ministry of Finance and
also in the railway department it has been de-
termined to demand that a duty of 80 kopek per

our reporter had promised would take place
soon, though somewhat detained by the se-
vere weather and necessary repairs, will take
place at no distant day. The machine shops
are full of business preparing the blast fur-
naces for immediate operation. When it is un-
derstood that when these furnaces are once
fired, it is the intention that they will be kept
in operation five years, night and day, without
interruption, the delay in starting them will be
overlooked. These furnaces are considered sec-
ond to none in this country, and will give em-
ployment to about 100 men, seven days in the
week, at from \$2.50 to \$3 per day. Mr. Scott,
the president of the Joliet Iron and Steel Com-
pany, is a practical blast furnace man, and has
been interested in the business since 1845.
Mr. Smith, the superintendent, is also a prac-
tical man in this direction, and has a very
thorough understanding of the business. The
man who will have immediate charge of the
blast furnaces is Mr. J. J. Gear. He came to
Joliet with J. T. Torrence, with a view of put-
ting the furnaces in operation. He is one of the
finest blast furnace men in the country. He
commenced the trade at the Green Mountain
Iron Works, Rutland county, Vermont, in 1835.
He has since worked on the Hudson River,
New York; on Lake Champlain, in Peter Cooper's
works; on the Delaware, at St. Louis, and
other places in this country. He also spent
two years at Crusoe, South France, learning
what he could about the Bessemer process. He
says that the one object in operating these
furnaces, is to work up the waste and scraps
from the converter and rail mill, hundreds of
tons of which are now of no use whatever. It
is intended to build a machine for the pur-
pose of washing all scraps and cinders. After
the blast furnaces are once in operation it
will cost at least \$10,000 to blow them out,
which makes it very probable that they will be
kept in operation for some years at least. The
converter and steel rail mill are now running
splendidly, having made recently the heaviest
run in each of these departments ever made
since the Joliet mills commenced operation.
The character of the rails made is excellent.
Mr. Dunning and Mr. Gardner are both shov-
ing things forward with fine success, and have suc-
ceeded so far in maintaining the almost good
feeling among the men.

At the office, Mr. Wilson informed us that
the pay roll for the past month would reach
\$28,000. He said there had been considerable
increase in the number of common laborers
employed during the past month.

The machine shops are full of work from the
blast furnaces, and have also a new set of rollers
in hand. The manufacture of frogs is
growing to quite a business, and will soon give
employment to twenty men. And now we
come to the iron mills, and can say we regard
their operations as a very uncertain matter. The
condition of the market is so unfavorable
that there is little hope that the company will
start the mills, but after all, a large amount of
old rails are being piled up alongside of the
iron mills which looks like something was go-
ing to be done. Superintendent Smith tells us
that the steel mills are running this week on a
1000 ton order for the Grand Trunk, an Eastern
road, and that more orders are likely to follow
from that direction—the East.

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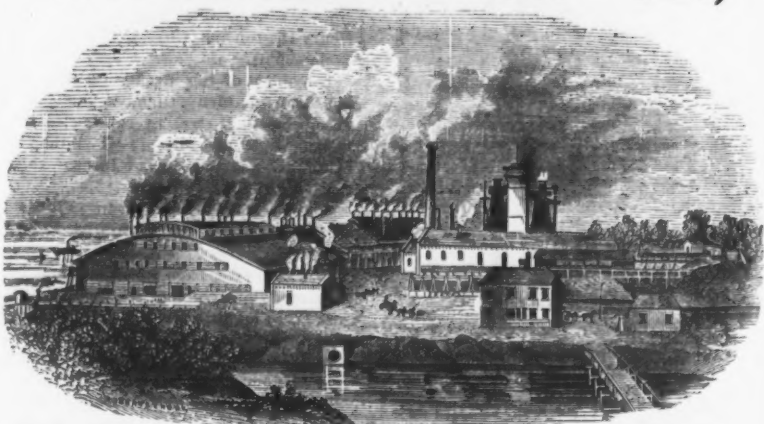
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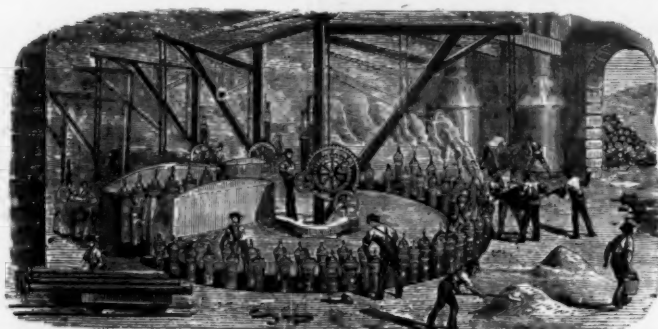
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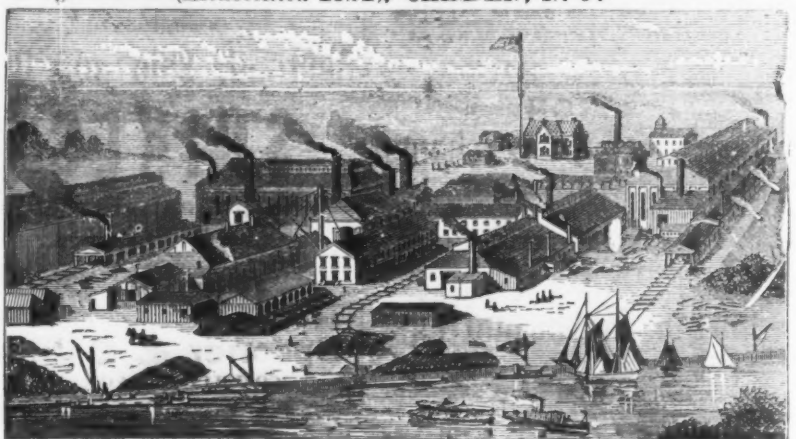
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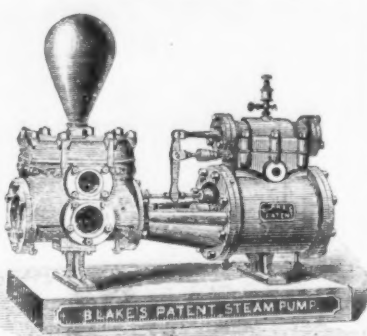
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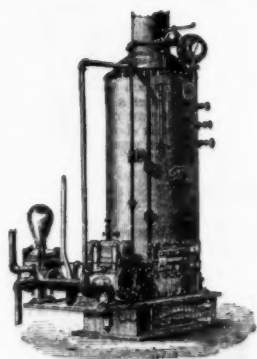
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The Troy Iron Trade.

A correspondent of the Times, writing from Troy, N. Y., says: One of the most striking events which has occurred for a long while in connection with the iron trade is the partnership union of the vast interests between the eminent firms of John A. Griswold & Co. and Erastus Corning & Co., of Troy. For many years these two firms have occupied foremost positions in the iron trade of the country; and the bringing of all their works under the control of a large private corporation must render the Albany and Rensselaer Iron and Steel Company, as the new organization is styled, an exceedingly powerful one. The works to be operated by the new company will include the Rensselaer Iron Works, the Bessemer Steel Works and the Albany Iron Works at Troy and the blast furnaces at Hudson and Fort Edward. The names of Griswold and Corning have been so long identified with the iron trade of the United States, and have so long been synonyms for success, that the prosperity of the new corporation may be fairly assumed to be assured. Mr. Erastus Corning is the president, and Mr. Chester Griswold the vice president of the company; Mr. Selden E. Marvin is the secretary and treasurer, and Mr. James E. Walker, long connected with the Albany Iron Works, is the general manager.

All departments of the new corporation's works, with the exception of the puddling department, are in operation. Indeed, the company's steel works and rolling mill are extraordinarily active. This is entirely due to the wise firmness of the proprietors in dealing with the labor question, while showing the most conciliatory and considerate action toward their employees. While Pittsburgh is lying idle, Troy is hard at work. Last fall considerable pressure was brought to bear on the great iron firms of Troy with a view to the employment of their large force of working men during the winter, the prostration in the iron trade and the heavy loss entailed on the manufacture of iron at the then current market prices and rates of wages rendering the prospects both of employers and employed very gloomy. The three firms, individually and collectively, were most anxious to do something for their workmen. The difficulty was as to the best way to do something. It was finally determined to carry on all the works till the respective warehouses would not hold another pound of iron, provided the men would consent to a reduction of 20 per cent. in their wages, thus enabling their employers to sell their iron just at cost and no more, investment of capital, time, and risk all being willingly shouldered as a burden by the masters. This proposition was made to the men in October, and refused—the puddlers taking the lead, and the rollers, heaters, and laborers following suite. The principal trouble was with the puddlers, and a great many men in the other departments were willing to go to work, but were controlled by their unions. Mr. Griswold determined to take the bull by the horns. He issued notices that he would on a certain day in November start the Bessemer Steel Works, and that he should endeavor to supply the places of all men who did not report on that day. Very few reported, and green hands were immediately introduced into the converting department of the steel works. In two weeks' time the steel works were running with full force on double turns, and Mr. Griswold determined to start the blooming mill. The heaters and rollers refused to go to work, but one or two furnaces were started with green hands under the personal superintendence of the proprietors, and the men were carefully instructed in their duties by the foreman. Every day extra men were selected from among the most intelligent of those applying for work, and added to the force; and in the fortnight the mill was entirely resumed and running in double turns; and, strange to say, with a largely increased production. Whereas the product in the converting department of the steel works was formerly 125 to 150 tons a day, it now runs up to 225 to 250 tons a day. The next thing was to open the rail mill. The same notices were issued as in the case of the steel works and blooming mill. Only one boy reported, and Mr. Griswold at once proceeded to put in green hands. At the end of the first week half the furnaces were running on single turns. In the second week all the old men offered to come in, but demanded that the old men at the steel works should be reinstated. This demand was peremptorily refused, but the men were told that they could come in on signing an agreement to give up their unions forever. This they did in December, and the puddlers are now the only strikers, the rollers, heaters and laborers of the other works having agreed to accept the reduction of wages on the breaking up of their unions. The absurdity and wickedness of this strike is shown in the following significant fact—that since the break up of the unions, the production of the works has increased from five and twenty to thirty per cent., with the same plant and the same numerical force, the men thus making a clear gain of five to ten per cent. in their earnings, after allowing for a reduction of twenty per cent. The battle is now being fought with the puddlers, and the different firms, collectively and individually, are determined to replace every puddler who will not leave his union and come in. They offer \$3.75 a ton for puddling, and this is usually a better price than is paid in Pittsburgh and elsewhere. In Troy, the free use of Port Henry ore for puddling purposes, and the superior construction and mode of operating the furnaces enable the puddler to get six heats a day instead of from four and a half to five, which is the average elsewhere. At all events, puddlers, at \$3.75 per ton, can easily earn \$3 a day, after paying their helpers. Already a large number of non-union puddlers have accepted employment in Troy. The Messrs. Burden have more than half the furnaces running double turns, and the Rensselaer and Albany Companies have a large number running single turn. And yet the old union puddlers stand by and see their places filled up day by day by non-union men. They fancy that the iron masters will eventually give in to their demands. They are grievously mistaken. The

employers of Troy have seen how selfishly the puddlers are willing, for their own advantage, to enforce idleness on their fellow workmen. They think it monstrous that three hundred men should thus attempt to keep thousands out of employment. They have determined to stop it for once and for all time; and no union puddler will ever again find employment in the iron works of Troy.

What Dirt and Bad Ventilation Have Done in the Past.

It would seem that more than half the people of the land think that the great hue and cry about the evils arising from the want of ventilation is nonsense—that sewer gas, if not too offensive, or dirty streets, are not very harmful. All these things, they say, probably shorten life, but they do not understand, or will not believe, that epidemics may be caused by dirt, and that want of ventilation, filth, and the general neglect of sanitary precautions, have frequently caused the most fearful of plagues.

People often wonder why we do not have such awful visitations at the present day as the plague of London, the ancient spotted fever, sweating sickness, etc. They often forget that we are not yet free from the cholera nor the yellow fever, and the next generation may see that our neglect of sanitary precautions as plainly caused the visitations of cholera and yellow fever as the dirt and filth of London the great plague.

From the end of the Roman Empire to the end of the Middle, or Dark Ages, the people of Europe were unwashed. We all know from our histories that civilization was very backward, but the exact condition of society, and the state of the houses, is rarely, if ever, mentioned.

Of Paris it is recorded by Regard, the physician to Philip Augustus, that one day when the king, walking to and fro in his audience chamber, went to look out upon the river for recreation, some carriages belonging to citizens happened to pass in the street below the window, when the substance forming the street, being stirred up by the revolution of the wheels, emitted a stench so intolerable as to overpower Philip. This so disgusted the king that he urged the citizens to pave the streets, and to perfect the purification of the city, he built a wall around the cathedral to prevent it from remaining longer a common corner of convenience. Yet these measures were attended with great murmurings among the people. What wonder that pestilences were so common when the public streets were in such a condition. One writer, in speaking of the condition of London, says that in the streets around St. Paul's Churchyard the horse manure was a yard deep, and also speaks of the streets as never having been cleaned. Public muck heaps were to be found commonly in the towns. Floors were of clay covered with rushes that grew in the fens, which were so slightly removed now and then that the lower part remains sometimes for twenty years together, and in it such a collection of foulness as we should hardly expect to find in a city scavenger's cart. The chronicler goes on to specify of what the matter consisted, but we cannot mention the substances here. The odors were not those of Araby the blest, so to cover up the badness of the smells perfumery was largely used, and fragrant gums burned to sweeten the air. In person the cleanliness was rather negative than positive. Clean garments were put on, but the dirty shifts beneath were not changed until by decay and wear they departed piecemeal from the unwashed body of the wearer.

The history of Chester furnishes her for one of the best examples of the danger of neglecting public cleanliness and ventilation: "In 1507, sweating sickness very sore in Chester for three days; 61 died. 1517, great plague; grass a foot high in the streets. 1550, sweating sickness. 1603, great plague begun in one Glover's house, in which 7 persons died; 60 died weekly, in all 650 persons and 61 of other diseases. 1604, plague, very hot; 813 deaths. 1605, plague still increasing; 1313 died of it, beside those of different diseases," which were very largely increased at such times. In 1649, 2009 persons died of plague. The city was so filthy that the dirt carted out of some of the streets and lanes was sufficient to make a bank by the water at a cost of some £100. In a neighboring city it was noted and recorded in the public annals that in 1680 the great truck hill at the East gate was spread over St. Catherine's ground, close by.

The goal fever was another disease which in those times was dreaded by all classes of society. Unfortunates and criminals were alike confined in damp, cold, unventilated dungeons, and kept in a state of inactivity. The effluvia from their own bodies, and the want of any means for personal purification or of bedding and clothes during imprisonment, filled their clothes with such exhalations that a disease was engendered of deadly malignity. The prison house was a focus of contagion. It was remarkable that though the prisoner might escape, his clothes exhaled a pestilence that scattered death around wherever he went. At Oxford, in 1577, was held the famous Black Assize, so called from the horrible catastrophe on that occasion, produced by the goal fever. One Baker, in his chronicle, tells us that all who were present in court died in forty-eight hours—the judge, the sheriff, and 800 other persons. Such was one of the terrible calamities which visited a community as a direct punishment for, or a result of, the neglect of proper sanitary treatment of prisoners. Perhaps the reader thinks that such things are impossible at the present day, but in every town whole families are to be found in which the bathing of the person is unknown save in summer, when the men may indulge in swimming for the sake of the coolness. In the cities hundreds of families have no opportunity for bathing, and thousands of persons never have clean linen. What wonder, then, that scarlet fever becomes so malignant when once it begins its ravages, or that diphtheria is of a character that defies control.

In the great London plague few of the better classes of people were attacked; those that died were from what was then literally the great unwashed. London would have had frequent visitations of the same dreadful disease, and the 100,000 inhabitants lost in the great plague would only have been a beginning, had not the great fire which followed purified the city and burned out not only the infection, but the houses and soil. When the new buildings went up the science of health was better understood, and the new city being clean, escaped from what would have been the constant cause of the old.

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Slaters' and Coach Makers' Tools. Merchant's Improved Dowelling Machines.
Solid Cast Steel Pump Auger.
Any one in the trade not receiving my new Price List will please inform me.

G. W. BRADLEY'S EDGE TOOLS.

Butchers' Cleavers,
Corn Knives,
Bush Hooks,
Coopers' Tools,
Ship Adzes and Axes,
Drawing Knives,
Axes and Hatchets,
Grub Hoes,
Picks and Mattocks,
Mill Picks,
Box Chisels & Scrapers.

NATHAN WEED, 37 Chambers St., New York.

WRIGHT'S
Double Acting,
BUCKET - PLUNGER
STEAM PUMPS.
ALWAYS RELIABLE
VALLEY MACHINE CO., Easthampton, Mass.



KANAWHA PUMP WORKS

Burlingham & Purdy,

PROPRIETORS.

Depots:

55 Camden Street,
Baltimore, Md.103 Chambers Street,
New York.Factory, Charleston,
West Virginia.

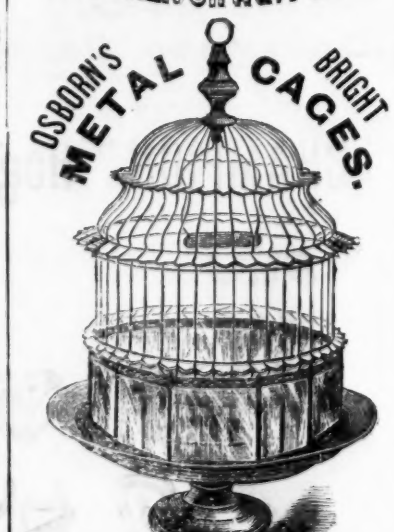
Manufacture the Genuine

CUCUMBER WOOD PUMPS.

Price List with description sent on application.
See wholesale price current in this paper



OSBORN, MFG. CO.
TRADE MARK
BLEECKER ST. NEW YORK



The Original Inventors and Manufacturers of the
OSBORN BRIGHT METAL CAGES.

Also OSBORN & DRAYTON improvements under twelve different patents. We are continually bringing out new and beautiful designs to meet the demands of refinement and taste.

ALVAN DRAYTON, General Agent.

SPRAGUE SASH WEIGHT CO.,

YOUNGSTOWN, OHIO,

Manufacturers of

SPRAGUE'S IMPROVED Sectional Sash Weights.

Orders solicited from all parts of the country

Reasons for Using our Goods.

Hogs when ringed are prevented from rooting, and fatten quickly.

Pastures and clover fields are kept smooth and are not destroyed by the hogs rooting them up.

Feed lots in the winter are kept smooth, and corn that is otherwise rooted and tramped into the ground is saved.

The **Triangular Wire Ring**, manufactured only by us, is the only wire ring that can be inserted in the hog's nose with one grip on the **Ringer**, and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.



SOMETHING NEW.

We shall this present season make a **Heavy Tinned Wire Ring** that will not rust in the hog's nose. The strongest and best ring in the market.

Prices.

Ringers, retail.....	\$1 00
" per doz.....	6 00
Rings per box (100) coppered wire.....	50
" per doz boxes (1000) ".....	3 00
" per box (100) tinned wire.....	60
" per doz. boxes (1000) tinned wire.....	4 00
Tongs or Holders retail.....	1 25
" " per doz.....	9 00

The coppered wire ring will be sent unless otherwise ordered.

Samples by mail postpaid on receipt of retail price.

Goods sent C. O. D. with privilege of examination before paying charges.

Net prices in quantities, circulars and posters mailed free.

Our advertisements are now inserted in over 1800 newspapers, published in every State of the Union, so that dealers will find large demand created for our goods.

USE THE BEST.



Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

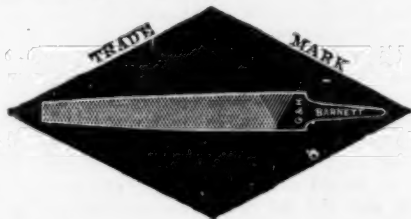
Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

Black Diamond File Works.

Send for Illustrated Price List.



Send for Illustrated Price List.

G. & H. BARNETT. 39, 41 & 43 Richmond St. Phila.
LINFORTH, KELLOGG & CO.,
Sole Agents for the Pacific Coast, 3 & 5 Front St., San Francisco, Cal

FILES
AND
RASPS.
IMPORTED STEEL
BY THE
Auburn File Works,
AUBURN, N. Y.

JOHN ROTHERY'S
Celebrated Hand-Cut FILES,
Made of Best English Cast Steel.

WALSH, COULTER & FLAGLER, Sole Agents,
83 Chambers and 65 Reade Streets, N. Y.

EDWARD PHELAN,

Surviving Partner of W. F. SHATTUCK & CO.,

No. 113 Chambers and 95 Reade Streets, New York,
MANUFACTURER OF AMERICAN HARDWARE.

Coco & Taft's Pat. Wrenches. Cocoon Nut Dippers. Measure's Wrt Iron Goods.
Axe, Pick, Sledge & Hammer. Wire Saws. Shattuck's Platform Counter
Handles. Scale Beams. Scales.
Gimlets and Gimlet Bits. Patent Tap Wrenches. Saw's Cow Bells.
Augers and Auger Bits. Brundage Horse Nails. Axes, Picks and Hatchets.

NEW YORK SCREW BOLT WORKS.

(Estate of R. J. DEWHURST, deceased.)

JOHN COCHRANE, Executive Agent and Manager,

Office and Works, cor. Ave. D and 11th St., N. Y.

Bolts, Nuts, Turnbuckles, Washers, Forgings, &c

The attention of large consumers solicited.

PHILLIP'S Patent Boring Machine



Guaranteed the best Boring Machine in the market. It will do one third more work than any other machine. The Auger is self measuring, self gauging and self driving. With the recent improvements in construction, strength and finish, it is decidedly the cheapest, most durable and most rapid working machine made.

Sold to the Hardware trade only.
Address, for descriptive Circular and Price List
PHILLIPS MFG. CO., Pittsburgh, Pa.

DEAN'S New Patent (1873) Screening Scoop SHOVEL

For Coal, Coke and Coal Ashes, and other Substances.

The largest frames are 18 by 15 inches, with seven bars, and are made of the Best Malleable Iron. They are, or can be, wired between bars by an arrangement of holes a quarter of an inch apart, by an ordinary person, to screen any size substance desired. They are warranted to be the most durable and practical Screening Shovel made, or money refunded.

Reference—All New York Gas Companies and Hotels.
Please address orders to
A. SEE & SON,
N. Y. Shovel Works,
1355 Broadway, N. Y.

Price: Largest size \$80 per doz. and upwards, according to size of spaces.

Clement & Hawkes Mfg. Co.,

Manufacturers of

SHOVELS.

Planters' Hoes, Trowels and Machinery.

Northampton, Mass.

Send for Circular and Price List.

Schweitzer Mfg. Co.,
57 Reade St., N. Y.
IMPORTERS & JOBBERS.

Established 1816.
Peter A. Frasse & Co.,
95 Fulton Street, New York,
SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works,
SHEFFIELD.

FILES AND HORSE RASPS,

And Importers of

STUBS' FILES, TOOLS & STEEL,
W. J. Davies' Sons' London Emery Cloth,
HUBERT'S FRENCH EMERY PAPER.

EVERY FILE WARRANTED.

Equal to the
BEST.

Western Files.
Works, Beaver Falls, Pa.
Western Files.
Office, 96 Chambers St., N. Y.
Western Files.
LARGEST CAPACITY
Of any File Works in the World.
In the face of strong prejudice against American files, this brand has earned a reputation second to none. The trade in all sections testify to their excellence. We confidently offer these files as superior in every respect and cheaper than any first-class files in the market. A trial will confirm their reputation.
MINOT & CO., 239 Franklin St., Boston, New England Agents.

McKINNEY MFG. CO., Hamilton, O.

Wrought Butts, Strap & T Hinges.
Send for special discount sheets.

"CHAMPION" Hog Ringer and Rings.

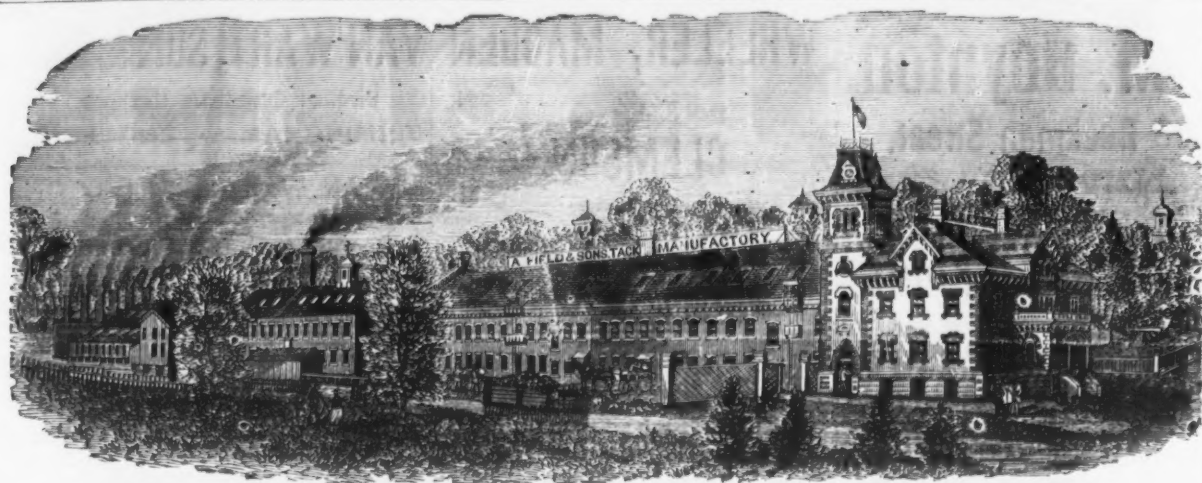


The only Ring invented that will effectually prevent Hogs from Rooting. Being a Double Ring it is equal to two or three of any other Ring. Having no sharp points in the flesh it does not cause irritation or soreness as in other Rings. The smooth part of the wire being in the nose, it bends rapidly. One of our rings being equal to two or three of any other ring, makes this ring cheaper than the cheapest ring in the market. Time and money saved in using the Champion Hog Ringer. One operation and the work is done.

Price of Hog Ringer, 75c. each. | Price of Tinned Hog Rings, 60c. per 100.
Coppered Hog Rings, 50c. per 100. | Hog Holder, 75c. each.

Discount to the trade.
CHAMBERS & QUINLAN, Exclusive Manufacturers,
DECATUR, ILLINOIS.

Original Manufacturers of Tinned Rings.



A. FIELD & SONS,

TAUNTON, MASS., Manufacturers of

Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDS IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and steel Shoe Nails, Carpet, Brush and Gimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails

Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks, Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

* WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

OTIS PASSENGER —AND— FREIGHT ELEVATORS

FOR HOTELS, OFFICE BUILDINGS, STORES,
WAREHOUSES, FACTORIES, MINES,
BLAST FURNACES, &c.

OTIS BROTHERS & CO.

SOLE MANUFACTURERS,

348 Broadway, New York.

EMPIRE PORTABLE FORGES

NO BELTS, BELLOWS OR CRANKS
The Best Made.

Send for Catalogue to the

Empire Portable Forge Co., Troy, N. Y.

THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.

Surplus - - \$1,800,000, Gold.

The New York Agency, 50 Wall St.,

Buy and sell Sterling Exchange, makes Cable Transfers, grants Commercial Credits, and transacts other Banking Business.

J. G. HARPER, Agents.

J. H. GOARBY, Agents.

HOLSTING

Machinery

Mfd. by

CRANE BROS

MFG. CO.,

Chicago.



Tempered Steel Spiral Springs,

Of all sizes and descriptions, made to order by
JOHN CHATILLON & SONS, 91 & 93 Cliff St. N. Y.
Our Springs are used by the U. S. Government, and various Meteorological and other Scientific Institutions.

CROCKER BROTHERS,

32 Cliff Street, N. Y.

METALS.

Anthracite Pig Irons,

COLD AND WARM BLAST CHARCOAL IRONS,

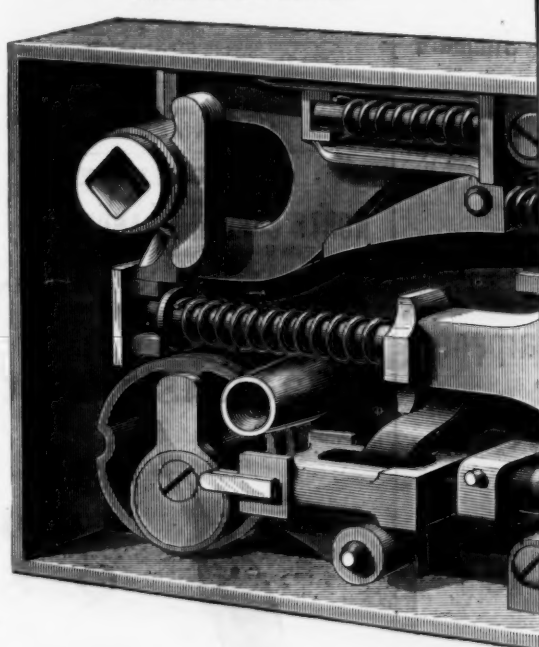
American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.

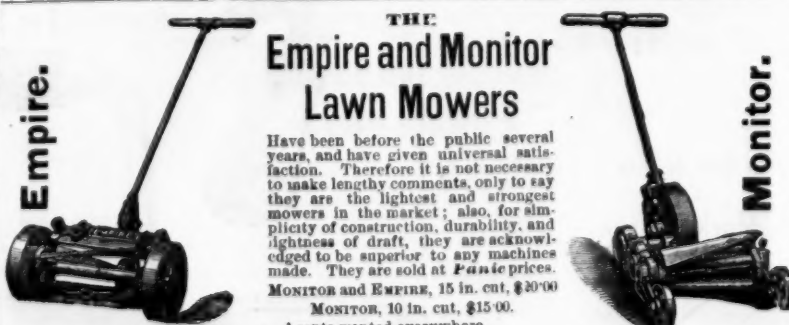
Yale Mortise Night Latch No. 70.

WITH CAP REMOVED SHOWING
INSIDE OF LOCK.



Yale Lock Mfg. Co.,

No. 298 Broadway, NEW YORK. STAMFORD, CT.



THE Empire and Monitor Lawn Mowers

Have been before the public several years, and have given universal satisfaction. Therefore it is not necessary to make lengthy comments, only to say they are the lightest and strongest mowers in the market; also, for simplicity of construction, durability, and lightness of draft, they are acknowledged to be superior to any machines made. They are sold at *Factory* prices.

MONITOR, 10 in. cut, \$20.00

EMPIRE, 10 in. cut, \$15.00.

Agents wanted everywhere.

MANUFACTURED BY

BARLOW & WALKER, Sing Sing, N. Y.

BUSINESS ITEMS.

PENNSYLVANIA.

At Packerton, the Lehigh Valley Railroad Company, taking advantage of the low price of labor and materials, are building 6000 coal cars, turning out 96 per week. About 1900 men are kept steadily employed.

A new boiler shop has been erected at Sharon, where the old one was burned three weeks ago. The shop is quite an improvement, being larger and more convenient than the old one.

Messrs. W. D. Wood & Co., of McKeesport, have raised the framework for the additional building to the planishing department of their extensive works. It is the intention of the firm to put in one additional steam hammer in this department, and also another in the forge for the manufacture of blooms. This will give employment to 15 or 20 additional hands.

A lot of Centennial iron, principally round iron, has been made by the Phoenix Iron Company, Phoenixville.

The sheet mill of the late Samuel Oliver, at Easton, now under the direction of his son, Theodore Oliver, has started in full blast and with excellent prospects.

There are good prospects that the Watson-town Car Works will soon be in operation.

The Forsyth Scale Works have been removed from Rochester, N. Y., to Erie.

Marshall Furnace, on the Juniata, near Newport station, is in full blast and working admirably.

Matilda Furnace, Huntingdon county, has again been put in blast.

MASSACHUSETTS.

An order for 21 pumps has just been received at the Knowles Steam Pump Works, Warren.

The Washburn Car Wheel Company's works, in Hartford, Conn., and in Worcester, are running on full time, with a heavy pressure of orders, compelling night work in one of the departments of the Hartford factory.

A new iron bridge of two spans, 104 feet each, has been completed by Hawkins & Burrall, of Springfield, for the Cheshire Railroad, at Troy, N. H.

The final removing of the American Screw Company from Taunton is expected to be accomplished by the 1st of May.

RHODE ISLAND.

The Providence Machine Company employ 350 hands when running full, but only 150 are at work at present. The works cover over 100,000 square feet, and consist of a main building, 230x60 feet, three stories and attic; pattern house, 95x25 feet; blacksmith shop and planer room, 234x36 feet, half of which is three stories in height; engine room, 40x33½ feet; foundry, 60x30 feet, with an L 24x48 feet; ware room, 83x36 feet; and store building, 80x30 feet. The very best of machinery is in abundant supply, run by a 60 horse engine. The company make all kinds of cotton machinery and pay particular attention to the manufacture of improved roving frames. These machines weigh some four tons each, and are turned out at the rate of 25 per month. Two thousand five hundred and sixty seven of these machines have left the works since January 1, 1847, of which nearly 1100 were of the improved pattern. These machines went to the premises of 351 concerns, which fact renders other comment superfluous. An order for 40 machines for the Shove mills, at Fall River, Mass., has just been filled by the company.

CONNECTICUT.

The Hartford Evening Post says that the Billings & Spencer Company are still at work on their order for the Prussian government. The company have just begun the manufacture of ship chandery, marlin spikes, calking irons, etc. They are also making a new style of clamp lathe dog, which is taking well in the market. During the past year the company made 40 tons of steel dies for the Prussian government, which dies are to be used in the manufacture of needle guns. Between 60 and 70 men are employed in the factory. The forging works have been increased in capacity, and they now have 14 drops, 3 trip hammers and 4 hot trimming presses.

No material reduction has been made during the winter at the Phoenix Iron works, Hartford. They have their regular force of 75 men, and are engaged on the iron work for the new railroad depot at New Haven, and other heavy castings. The outlook, from present indications, is favorable.

As soon as building operations fairly commence an active spring trade is anticipated by the National Screw Company, Hartford. They have 125 men employed, which is about the same as last fall, and the orders at present are on an average with those of last year.

The Woodruff Iron Works, at Hartford, are overrun with work beyond their capacity to fill orders, and have 150 men on the pay roll. Even if no new orders should be received there will be sufficient work for weeks to come. Eleven large boilers are under way. The pay roll of the workmen of this establishment footed up \$115,000 during the year 1874.

For about seven weeks the Hartford File Company have been shut down, but they are soon to begin work again with an increased number of hands and facilities for the manufacture of files. The capital of the company is to be increased, and perhaps doubled.

OHIO.

The Sprague Sash Weight Factory, at Youngstown, has a Colorado order for 10 tons of their product, and other orders from several prominent points in the West.

A company has been organized in Cleveland, on a basis of \$25,000 capital, for the manufacture of scales.

The new furnaces of the Etna Iron Works, at Ironton, will be completed and put in blast the last week of May or in the beginning of June. These two stacks are each 90 feet high with 18 foot bushes, and have Whitwell stores and the Verrie self-cooking apparatus.

Twenty safes a day is the present product of the Hall Company, Cincinnati. It is the intention of the company to soon increase the number of the employees and the amount of work, present orders seeming to justify such a move.

INDIANA.

A company has just been organized at South Bend with a capital of \$80,000, for the manufacture of reapers, woodworking and farm machinery. Active work will be commenced at once by them under the name of the South Bend Reaper and Machinery Company.

Apprentices.

The Venerable Thurlow Weed writes as follows concerning the Apprentice law passed during the last session of the Pennsylvania Legislature: The passage of a law extending to the boys of Pennsylvania the right to learn mechanical trades is a boon and a blessing the more gratifying for being unexpected. I have repeatedly but unavailingly endeavored to awaken and direct Legislative attention to the despotism of trades unions, especially in reference to the question of apprenticeships. I knew, of course, the embarrassment of members representing cities and villages, and while I did not expect much I hoped for something. The "unions" form constitutions and adopt by-laws, to which they attach all the solemnity of legal enactments. Article 22, in the pamphlet printed by the Hatters' Trade Association, relating to Apprentices, reads as follows:

Number of Apprentices.—That shops employing five or more journeymen for one year be entitled to two apprentices; shops employing less than five journeymen for one year be entitled to one apprentice; and shops not having a journeyman employed, not to be allowed an apprentice.

In another section of this Article, it is provided that when apprentices want to leave shops "declared foul," they must obtain the consent of the "Association." Still another section declares, that in no case shall an employer have more than three apprentices. It is worse than idle to talk about free trade or freedom in any form, while one of the great industries of the country is subjected to such despotism.

Pennsylvania has set a noble example. Let other States follow, and we may hope to see a generation of boys rescued from idleness and vice, and after graduating from the shoemakers', hatters', tailors', tanners', carpenters', cabinetmakers', masons', machinists', bakers', and other shops and factories, become eminent alike as representatives and rulers. Every intelligent boy learns during his apprenticeship how many mechanics have risen not only to great wealth, but to high positions in their municipal, State, and national government. That knowledge animates, cheers and encourages him. In what apprentice to the "art preservative of all arts" did the knowledge that Benjamin Franklin was an apprentice fail to inspire a desire and a determination to adopt and imitate the examples of industry, sobriety, study and virtue, that enabled him to rise to positions of usefulness and eminence, and to transmit to posterity a name that adorns the history of his country? Shoemakers' apprentices read with pride that Roger Sherman, of Connecticut, one of the signers of the Declaration of Independence, learned their trade, and that Henry Wilson, Vice President of the United States, was working as a journeyman shoemaker when first elected to the Legislature of Massachusetts. Millard Fillmore, a late Vice President and President of the United States, was an apprentice in a country clothiers' establishment. Andrew Johnson, another late Vice President and President of the United States, learned and worked at the tailor's trade. Simon Cameron, formerly Secretary of War, and now United States Senator, was originally a printer. David K. Carter, formerly a member of Congress from Ohio, now Chief Justice of the Court in the District of Columbia, was my apprentice at Rochester. Several mechanics have been Mayors of the city of New York, prominent among whom were Stephen Allen, Gideon Lee and James Harper. Daniel Cady, for more than thirty years one of the most distinguished lawyers our State ever produced, served his apprenticeship and worked as a journeyman shoemaker until he was twenty-four years old.

A Simple Fire Detector.—A simple, cheap and effective arrangement for the instantaneous detection of fire has just been brought out in England. The arrangement consists of a wire, which may be carried through any number of rooms, one end being fixed and the other connected with an alarm bell. The wire, however, is not continuous, but is broken in every room, the ends being connected by a strip of gutta-percha 4 inches long. This material melts at a temperature of 110° Fahr., so that on a fire breaking out in any one room the gutta-percha extends, and the wire being drawn out, either by a weight or a spring in the alarm, the bell is sounded and the alarm of fire thus given. In order to indicate in which room the outbreak of fire has occurred, the ends of the wire between which the gutta-percha detector is placed are linked together with a metallic chain. Thus, upon the extension of the detector by heat, the wire is only lengthened to the extent of the chain, the length of which varies with each room. In connection with the alarm is an index to which the wire passes, and in which it is terminated with a weight, and the distance to which this weight falls registers on the indicator the room in which the fire has taken place. Another form of this detector is that of a small box, which contains the strip of gutta-percha, a train of clock-work and an alarm bell, so that it may be hung up in any room. A good electrical arrangement has also been worked out, and where electrical bells are in use, the detector can be applied at a very small cost. There are also arrangements for ships, mills, theatres, and other large buildings varying in detail, but on the same principle, which, so far as we have seen it tried, has answered perfectly.

GEORGE GUEUTAL & SON,

39 West 4th St., New York.

IMPORTER OF



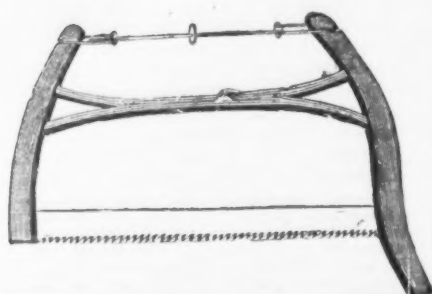
Wood Screws, Steel in Sheets,
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,

MANUFACTURER OF

Saws of all kinds.

FACTORY, WILLIAMSBURGH, N. Y.

**Elliptic Forked Saw Frame.**

Patented June 28th, 1870.

The annexed engraving represents my
ELLIPTIC FORKED SAW FRAME, which com-
mends itself to the trade for its simplicity
of construction. The Forked Frame
being all in one piece, without any center
bolt, secures for the Frame great strength
and durability. These Frames are put up
with my best Webs, marked "No. 40,
Harvey W. Peace."

HARVEY W. PEACE,

Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURGH, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot.

Patent Secured



THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by E. C. ATKINS & CO., Indianapolis, Ind., who are the **SOLE MANUFACTURERS FOR THE UNITED STATES.** So confident are we that this is the best Cross-cut Saw in the market that we **CHALLENGE THE WORLD.** Orders promptly filled.
E. C. ATKINS & CO.
Saw Manufacturers and Repairers, Indianapolis, Ind.

**Lloyd, Supplee & Walton,
HARDWARE FACTORS.**

MANUFACTURERS OF

**Bonney's Hollow
AUGERS.**

Stearn's Hollow Augers

and Saw Vises

Bonney's Spoke Trimmers

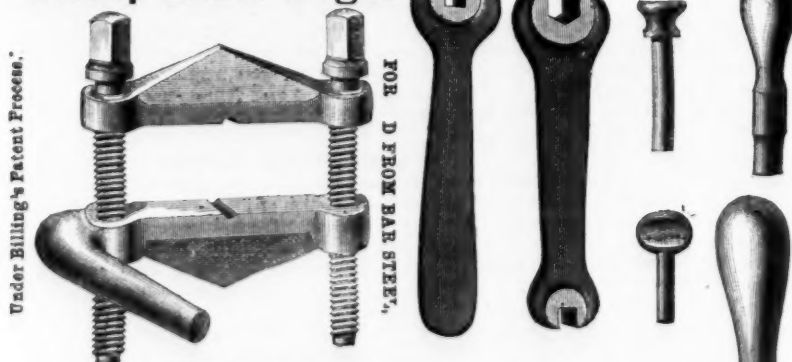
Double Edge Spoke Shaves

Adjustable Gate Hinges

Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.

**BILLINGS & SPENCER COMPANY, Manufacturers of
Clamp Lathe Dogs.**

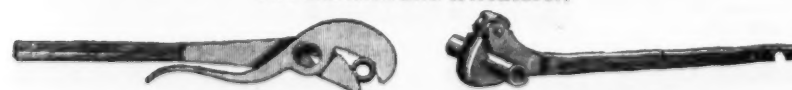
And Hardened.
A First-Class Article, and something that every machinist and Tool Maker will appreciate.

WROUGHT IRON AND STEEL DROP FORGINGS

of every description. Machine Handles, Lathe Wrenches, Thumb Screws, Milling
Machine Cranks, Spanners, Parts of Sewing Machines, Guns, Pistols, Drill
Chucks, and MACHINERY GENERALLY.

**THE BILLINGS PATENT SEWING MACHINE SHUTTLE,**

Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,
The Barwick and Wheatcroft

**Patent Self-Adjusting PIPE WRENCHES, of all sizes.**

Illustrated Circulars and Price List sent to any order on request.

Lawrence St., Hartford, Conn.

E. M. Boynton,80 Beekman Street,
NEW YORK,

Manufacturer of

**Saws of all kinds.
LIGHTNING SAWS.**

Also Sole Manufacturer of

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, out-lined on M tooth.

Telegram Dated Oct. 1st, 1874.

STATE FAIR, EASTON, PA.

To HENRY DISSTON & SONS:

Philadelphia, Pa.

I want you to publicly test that challenge on Cross
Cut Saws. Name time and place within thirty days.
American Institute preferred. E. M. BOYNTON.

E. M. Boynton gave on Wednesday of last week
an exhibition of what his Lightning Saw could do at
the Pennsylvania State Fair, in which two men
sawed through a sound oak log, 16 inches in diam-
eter, in 17 seconds. Mr. Boynton informs us that
his export trade is increasing, he having lately made
large shipments of his saws to Australia and other
distant markets.—The Iron Age, Oct. 8, 1874.

For fuller report of this exhibition see the *Eastern
Morning Dispatch* of Oct. 1st, 1874.
Henry Disston & Sons cannot furnish Lightning
Saws. Why do they imitate mine?

**J. FLINT,
Manufacturer of
ALL KINDS OF
SAWS**

And Plastering Trowels,

ROCHESTER, N. Y.

A large Stock of Cross Cut Saws constantly on
hand. Orders filled promptly. Dietrich's Double
Handle One Man cross cut Saw made with any
kind of tooth desired. Our patent method of grinding
Hand Saws makes them superior to any in the market.
Send for Illustrated Price List.

**Putnam's Government Standard
FORGED****HORSE SHOE NAILS.**Manufactured from the best of **NORWAY** Iron,
and warranted to give entire satisfaction.**S. S. PUTNAM & CO.,
NEPONSETT, MASS.****Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not batter or
break. Wears itself sharp. Will last twice as long
as any other Hoe, and is warranted to cut the
"Bolles Hoe" or any Hoe in market.

For Sale at Manufacturers' Prices by

RUSSELL & ERWIN MFG. CO., - - New York.
BYRNE & FITZGERALD, - - - Albany, N. Y.
KENNEDY, SPAULDING & CO., - - Syracuse, N. Y.

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

**A. PARDEE & CO.,
303 Walnut St.,
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MINERS AND SHIPPERS OF

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The following superior and well-known Lehigh Coals
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CLEMSON,**

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SAWSof every description,
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other Wood Saws,
&c., &c

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make a specialty of the **LARGEST SIZES** of
Circular Saws, and call particular attention of im-
portant manufacturers to the following points of excellence:
Evenness of Temper.—The peculiar structure of
my furnace subjects all parts of the saw to a **DEAD**
heat, and when dipped in the oil bath acquires perfect
uniformity.

Perfect Accuracy in Thickness.—My saws
are ground on a patent machine, automatic in its
operation, grinding off the thick places upon the
plate before the thinner parts are reached, and when
the saw is removed **BALANCES PERFECTLY**, which
is proof positive of the right accomplishment of the
work.

Properly Hammered.—Great care is taken that
no saw shall leave my works without due attention
in this important particular. A saw too tightly
strained upon the rim, or too loose in the center,
cannot be successfully run—hence the importance
of so hammering the saw as to effect equal strain
in all its parts, and at the same time **RUN TRUE**.
This department is under the personal supervision of
myself, who has devoted over twenty years to the art
of saw making.

I am sole proprietor and manufacturer of the cele-
brated "**Challenge**" Cross-Cut Saw. Price Lists
of all kinds of saws sent on application.

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(Wholesale & Retail, Props.)

**AXE, PICK, GERMAN & AMERICAN
SLIDGE, and other Handles.**
Full assortment always on hand.

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Hardware Commission Merchants,

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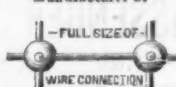
New Orleans—R. Rhodes, 71 Camp Street.
Montreal—J. J. Evans 14 St. John Street.

JOHN MAXHEIMER,

Patented,

June 3, 1862; April 6, 1869;
Dec 23, 1873; Jan. 20,
1874; Dec. 22, 1874.

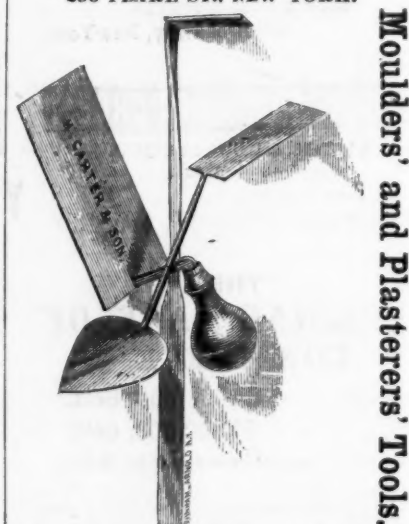
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Bright Metal

BIRD CAGES.Nos. 247 & 249 Pearl Street
NEW YORK.**H. CARTER,**

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Moulders' and Plasterers' Tools.

Manufacturers of and Dealers in all descriptions of
Moulders' and Plasterers' Tools, and Dealers in
General Hardware, Glided Copper Weather Vanes,
CARTER'S PATENT CARRIAGE LIFTING JACK, &c

Backus's Patent Bit Brace

AND

**Angular Extension
BORER.****Q. S. Backus,**

SOLE MANUFACTURER OF

ANGULAR EXTENSION BORER.

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This tool can be used in any brace, at any angle,
and also for straight work. Is the best and most con-
venient tool of its kind ever offered to the public.
Eight thousand sold the first year.

Also Manufactures the Straight Extension

Backus's Pat. Improved Bit Brace.

The socket is arranged so that the
strain does not come on the jaws,
but on the square hole which fits
the shank of the bit. The jaws at-
tached to the sleeve hold the bit
firmly in the square, and center it
true. The sweep is of wrought
iron. The general finish of the
stock is good. Its appearance is
neat. Mechanics who have used it
unanimously pronounce it superior
to all others; and we offer it to the
trade as the strongest, most simple,
and quickest operating brace in the
market. We manufacture five sizes.
The number of inches of sweep cor-
responds with the commercial num-
ber of the "set."

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John Russell Cutlery Co.,

FACTORIES AND OFFICE,
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Manufacturers of

TABLE CUTLERY, Butcher, Painters' and Druggists' Knives

IN GREAT VARIETY.

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Fine Ivoride Handle Table Cutlery, very White and Durable.

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MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors,
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Sole Proprietors of the renowned full concave patent

"ELECTRIC RAZORS."

Also Agents for the BENCALL RAZORS.

American Table Cutlery, Butcher Knives, &c.
14 Warren Street, NEW YORK. 423 N. Fifth Street, ST. LOUIS, MO.

TABLE KNIVES AND FORKS OF ALL KINDS,
AND EXCLUSIVE MAKERS OF



And the "Patent Ivory" or Celluloid Knife. These Handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

PATENT FINE PEN & POCKET CUTLERY

WEST MERIDEN, CONN.

The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knives. We also make

NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory or by

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The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

PLANE IRONS.

Gauges of all lengths, and circles beveled inside or outside. Nail Sets, Scratch and Belt Awns, Chisel handles of all kinds. Orders filled promptly; generally same day as received.

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MANUFACTURERS OF SUPERIOR

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WARRANTED TO BE MADE OF THE BEST MATERIAL.

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AMERICAN

PEN AND POCKET KNIVES,

MANUFACTURED BY

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My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society, also a Medal and Diploma from the Mass Mechanics' Ass'n Sept., 1860

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George Wostenholm & Son,
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Celebrated I-XL Cutlery, Razors, &c

AGENT FOR

WALTER SPENCER & CO.,
Steel and File Manufacturers.
(Rotherham, ENGLAND.)

CORPORATE MARK



Granted 1777

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Agent for

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Manufacturers of Razors, Table Knives, &c.,
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CELEBRATED CUTLERY,
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CHARLES PEACE, JR., Agent.

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REPRESENTING

GEO. WOSTENHOLM & SON,
CUTLERY AND RAZORS,
Washington Works, Sheffield.

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Cutlery and Table Knives.

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ROMER & CO.,

Established 1867.

Manufacturers of Patent Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Plan and Sewing Machine Locks.

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Illustrated Catalogues sent on application.

PATENT AUTOMATIC DOG MUZZLE.



We would call the attention of jobbers to the necessity of sending orders early in the season for the

Automatic Muzzle, which must supersede all others. It has the endorsement of Mr. Bergh, and is one of the best and most humane inventions of the age.

Manufactured by W. T. & J. MERSEREAU,

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Established in 1836.

Shelton Company,
Manufacturers of every variety of
TACKS & SMALL NAILS.
Carriage, Machine, Floor, Steel and
Tie Bolts, Coach Screws,
Bed Screws, &c.
BIRMINGHAM, CONN

The Law of Trade-Marks and their Analogues.

BY ROWLAND COX, ESQ.

I.

With the growth of American manufactures and commerce, the value and importance of trade-marks has come to be very generally recognized; but in respect of their legal nature, and the principles upon which their validity depends, not a little misapprehension exists. The subject is regarded as one that is full of subtleties and refined distinctions, and as a branch of law the metes and bounds of which are so obscure as to render it dangerously uncertain in its application. This misapprehension is not only without foundation, but prevails without any sufficient reason. There is, probably, no legal topic that admits of a more intelligent presentation to the lay reader, and none that is, in the main, freer from embarrassing technicalities.

Trade marks are a species of a genus that includes labels, brands, business signs, and other names and indices which individualize articles and places. The term "trade-mark" has been, perhaps generally, employed in a loose sense to signify every form of indicia applied to goods to denote origin or ownership. Many eminent judges have so used it; but a true definition limits it to a sharply-defined right, the qualities of which are materially unlike those that characterize its analogues. The distinction is by no means artificial, although the same principles underlie the entire genus, and govern the determination of a case involving a symbol upon a paper of needles, as much as one affecting the name of an ocean steamer. It is, therefore, important, at the outset, to point out a line of demarcation, the expediency of which will become apparent as the subject is developed, and which will be especially useful as defining the trade-mark proper and illustrating its advantages over what, for convenience, have been classified as its analogues.

A trade-mark, in its true sense, is a commercial signature, with all that the term implies. It is a word or words, symbol or symbols, applied by a manufacturer or dealer to goods of his production, or produced for him, to give notice that the goods are his. It is not a mere grouping of words or symbols, but is essentially a unit absolutely complete in itself. It may consist of more than one feature, but there must be an invariable unity, which admits of no substantial modification.

The analogue of the trade-mark may, however, be an aggregation or allocation of words and devices no one of which is a technical trade-mark, but which, as a whole, has a distinctive character whereby the aggregation has the effect of indicating origin or ownership. There may be a combination, any single element of which is the common property of the public, but the peculiar appearance of which as an entirety is the property of an individual.

But, as above intimated, the distinctions between the two classes will disclose themselves, in a manner to be more readily apprehended in the progress of the discussion of the different heads of the subject.

The best form of trade-mark is a word, chiefly from the fact that its nature is such that it has the quality of currency, if the term may be so used, whereby it circulates more readily than a symbol. Another pronounced advantage is that it comes in time to denote what is tantamount to a class of goods, and is quoted and alluded to as such. A notable illustration of these points is found in the case of "Stubs" files, the name "Stubs" (if it is not, as has been decided by one of the French tribunals, a mere commercial designation) is a model trade mark in many respects, although not wholly free from objection. A complete illustration is the word "Sapolio," or "Cocaine," either of which, while perfectly valid, is almost generic in its nature, each signifying practically a particular article of commerce, and enabling its owner to monopolize the entire trade in the same.

A word-mark, to be susceptible of protection must either be a "coined word," that is, a word originated by the party applying it, or it must be invested with a secondary meaning by a use in a new connection. Under no circumstances can it be sustained if it indicates any property or quality of the article upon which it is employed, or any like fact which may be stated with equal truth of similar articles produced by others. It must be original, either in itself or in its application; and in no sense descriptive. The words above mentioned, "Cocaine" and "Sapolio," are examples of "coined words," being unknown to the language prior to their invention by their owners; and "Gem," when applied to door springs, or "Atlantic," when applied to white lead, as examples of words invested with a secondary meaning. "Best," "Choice," "Superior," when used in connection with goods of any kind, are illustrations that are subject to the always insurmountable objection of being descriptive, or having relation to the article, and not to its origin or ownership.

The same considerations in respect of originality are applicable to a mark that consists of a symbol. The matter of its indicating quality, or being otherwise descriptive, is in a measure obscure, but is always a question of fact to be determined as such by the rules above laid down touching words.

The analogue of the trade-mark, however, while it must be original as a whole, may be descriptive from first to last and still be susceptible of protection. This is true, by reason of the effect of the aggregation as an entirety, being the subject of property, and not the single elements which are the vehicles of description. This point is somewhat refined, but it is settled law, and none the less certain because apparently too nice to be meritorious. It is made clear when it is understood that the *tout ensemble*,

without regard to the details, is the beginning and end of the right. Thus, although every single part, being descriptive, is *publies juris*, the arrangement of the parts in a peculiar allocation or design is a combination which is not descriptive. In short, the appearance or effect of the parts grouped in a particular way is what the law protects, and this appearance is unaffected by the words or symbols having relation to the qualities of the article.

Nova Scotia Coal Trade.

We append below the quantity of Nova Scotia coal produced and imported into the United States in the following years, and also the quantity of domestic bituminous produced and sent toward the seaboard in the same year, together with the duty and prices of each in the Boston market:

Nova Scotia Coal.					
Year.	Total Production.	Imp. U. S.	Duty.	Average Price at Boston.	Domestic Bit. Average Price at Boston.
1850..	163,794	98,173	34 ad.	196.848	196.848
1851..	131,976	116,274	"	277.679	277.679
1852..	171,821	87,542	"	334.108	334.108
1853..	190,935	130,704	"	339.979	339.979
1854..	213,259	139,125	Free.	659.581	659.581
1855..	216,338	133,222	"	662.262	662.262
1856..	231,384	136,152	"	718.451	718.451
1857..	268,808	123,335	"	805.791	805.791
1858..	289,618	186,743	"	856.929	856.929
1859..	267,496	122,730	"	1,006.656	1,006.656
1860..	304,129	141,289	"	1,474.616	1,474.616
1861..	351,531	201,457	"	880.788	880.788
1862..	393,631	192,612	"	5.60	1,291.924
1863..	434,425	282,774	"	7.40	1,656.862
1864..	406,699	317,594	"	10.40	1,711.791
1865..	651,256	462,394	"	9.60	1,989.231
1866..	681,766	401,292	\$1.25	8.54	2,482.931
1867..	542,127	338,492	1.25	8.10	2,748.102
1868..	462,188	224,132	1.25	8.16	3,112.681
1869..	568,062	317,435	1.25	7.78	2,951.742
1870..	625,766	168,180	1.25	6.91	3,913.536
1871..	673,342	165,431	1.25	6.54	4,451.950
1872..	880,950	151,092	75	7.70	4,741.267
1873..	1,051,467	332,419	800	8.00	4,931.118
1874..	363,368	75	6.75	4,666.976

We have not been able to obtain the official production of coal in Nova Scotia in 1874, nor the average price of domestic bituminous coal at Boston during 1874. The Boston *Shipping List* gives the average prices of Nova Scotia coal, and we would suggest that they would also give the average price of domestic bituminous hereafter, which far exceeds in quantity the imported article, for the information of all parties concerned.

Of the quantity of Nova Scotia coal produced in 1873, there were shipped to other places 881,106 tons, leaving 170,361 tons for home consumption.

We exported to Nova Scotia in 1874, 28,058 tons anthracite coal and 2109 tons bituminous; in all, 30,162 tons, the value of which was \$149,832.

The total production of coal in Nova Scotia up to 1874 was 12,258,142 tons.

Refractory Clays.

The study of the refractory properties of a clay of given composition is one most important to metallurgical operations. Dr. Carl Bischof has for some time been devoting his attention to the investigation of this subject, with the double object of estimating the refractory properties of a clay of any given composition, and also their respective behavior in the presence of liquefied metal. He has found a wonderful relation almost constant between the chemical composition and the properties of any clay, provided that the physical conditions are in all cases the same.

The refractory power of clays is determined by the quantity of pure pulverized quartz with which it is necessary to mix them in order that they should present any considerable resistance at high temperature. Instead of the quartz, a mixture of equal parts of silica and alumina may be used with advantage, in order to obtain even greater precision still in the results. The proportion of this mixture added should be rather greater than that of the quartz. The refractory properties of the clays are represented by reference to a standard clay whose refractory power is taken at 100. This typical fire-clay, when a portion of the mixed silica and alumina has been added, and been exposed to a heat sufficient to melt iron, breaks with an earthy fracture and seizes the tongue when applied, and absorbs an ink mark traced by a pen on its fracture. This should be the characteristics of all the good refractory clays. To find the respective co-efficients in each case, multiply the reduction or increase in the quantity of mixed silica and alumina added (taking the amount of the typical clay as 1) by 10 and subtract the product from 100, the remainder will give the respective refractory co-efficients of the different clays, that of the type being 100.

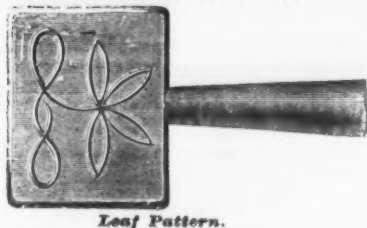
The action of liquid cast iron on the clays has been estimated by mixing four parts of iron with 100 parts of the clay investigated. At the melting heat of wrought iron, the influence of the oxide of iron has been found nil; the lime, however, and the potash have produced a vitreous surface. The manganese produces a similar effect, taking place immediately with the lime and the potash.

The chemical analysis and the experiments have clearly shown that the proportions between the alumina and silica, or between the alumina and the cast iron, vary in the same proportion as the coefficients of resistance. This rule was subject to a few exceptions, but it was proved that these exceptions were owing to the physical condition of the clay. It is, then, not necessary to pay attention to the dryness or dampness of the clay to obtain accurate knowledge of results from the chemical composition of the clays.

The above general principles will also apply equally as well to the case of clays subject to the action of glass, of slags, of metals, of metallic oxides, of bases and of salts, of cinders, &c. There is a perfectly definite composition to be produced in the typical clay to give the best possible refractory and resisting powers. Here, again, the action of the metals, &c., on the clay is found to be less strong as the co-efficient of the refractory power rises.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



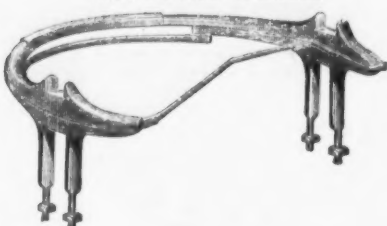
Leaf Pattern.

King Bolt Yokes.

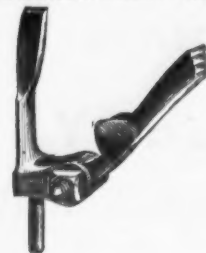


Established 1850.

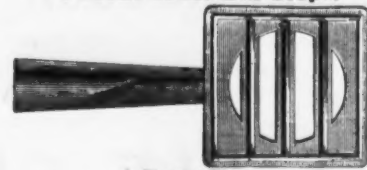
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.

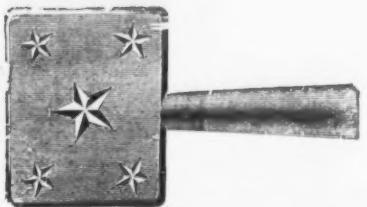
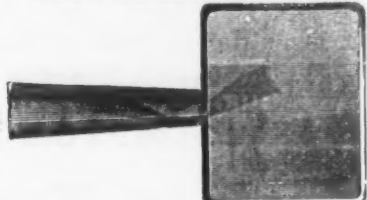


Upper View.



Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



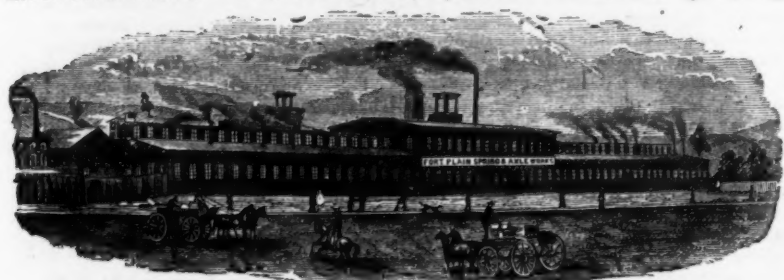
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FORGED CARRIAGE IRONS.

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Green Jacket Axles. FORT PLAIN, N. Y. Fine Carriage Springs.



MANUFACTURERS OF

English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,
Of any Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE
COLLAR to the FINEST OF STEEL.

Our facilities for manufacturing are very extensive, and with our recent additions of new and improved
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Buy the Best.

Clark's Patent
Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not
turn in its place.

MANUFACTURED BY

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Also Manufacturers of

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SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp
Heads and Screws; Parallel Bench Vises, Sash Pullies, Ho
House Pullies, Composition Cooks, Bench Screws, Vise Screws
Gridirons, Drill Stocks and Bows, Box Chisels, Rivets,
Sheaves, Block Pins, Composition Roller and Iron Bushings,
Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying
Pins, Marlin Spikes, Malleable Iron Castings, and Genera
Hardware.



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WILSON MFG. COMPANY,

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HOOPES & TOWNSEND,

Manufacturers of

MACHINE & CAR BOLTS,

Cold Punched Square & Hexagon Nuts,

Washers, Rivets, Wood or Lag Screws, Chain Links, Truck and Car Forgings,
Bridge Bolts, Bridge Forgings.

IRONS AND RODS FOR BUILDINGS.

1330 Buttonwood Street,

PHILADELPHIA.

CONCORD SPRING WORKS, J. PALMER & CO.,

Manufacturers of

CARRIAGE SPRINGS,

Superior Temper, Warranted.

CONCORD, N. H.

Philadelphia Star Bolt Works.

"STAR"

Carriage and Tire Bolts,

NORWAY IRON,
Button Head.

QUALITY GUARANTEED.



Trade Mark.

IXL
Carriage and Tire Bolts,
CHARCOAL IRON,
Beveled Head.

QUALITY UNSURPASSED.

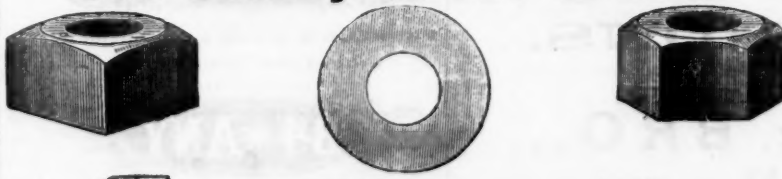
The Celebrated "STAR" Brand of Axle Clips.

Blank Bolts, Wood Screws, Square Head Bolts, Plow Bolts, &c., &c.

Our IXL Bolt is made from approved brands of Iron, and is equal in every
point of appearance to the regular Philadelphia Carriage Bolts, being made on the same machinery, and
the quality is not surpassed by any bolt of like grade in the market.

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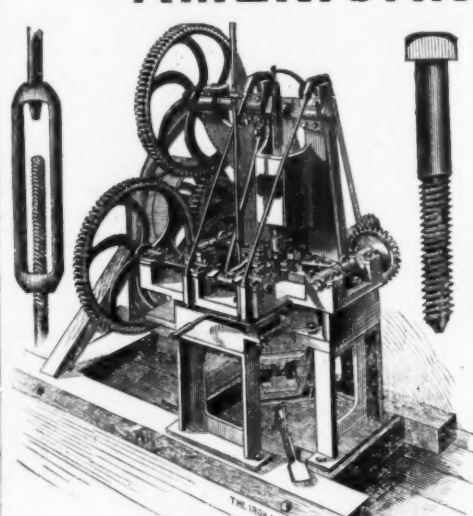
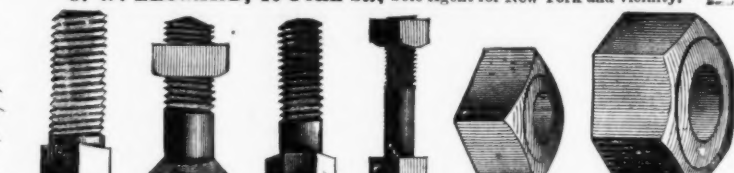
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The Iron Age.

New York, Thursday, April 1, 1875.

DAVID WILLIAMS - Publisher and Proprietor.

JAMES C. BAYLES - Editor.

JOHN S. KING - Business Manager.

New York, January 2, 1875.

Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents. Under the provisions of the new postal law, which went into effect on the 1st instant, payment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 60 cents; Semi-Monthly, 30 cents; Monthly, 18 cents.

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CITY SUBSCRIBERS will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

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American Car Wheels.

We have received the following interesting communication upon the subject of American car wheels as compared with the English wrought iron steel tired wheel. The letters therein quoted are from English gentlemen, both of whom, we believe, are engaged in the manufacture of wrought wheels, and who naturally look upon the introduction of a cheaper cast wheel with little favor. Their remarks, however, are so tinged with prejudice, and exhibit such an unwarranted fear of the competition of the cast wheel, that their statements have, practically, no value. It seems incredible that intelligent men should be ignorant of the fact that many of the statements which

they make are not only false, but impossible. It appears like a willful misstatement of the truth. We may further remark that the writers of the letters quoted by Mr. Earnshaw show a very marked ignorance of the state of feeling among English engineers, as well as a great want of knowledge of the characteristics of American car wheels and car wheel irons:

To the Editor of *The Iron Age*.—DEAR SIR: Having been engaged for some time in gathering information for friends in England about American car wheel irons, I have naturally taken great interest in the articles upon chilled cast car wheels which recently appeared in your paper.

I now give you extracts from two letters which I have lately received, upon the subject, thinking it may be of interest to some of your readers to see the opinions of practical men on the other side. I am also anxious to hear what answers the railroad engineers and car wheel manufacturers here will make to the objections raised by my friends.

LONDON, March 6, 1875.

"DEAR SIR: I was duly favored with your letters with reference to cast iron chilled wheels, and was anxious, before sending a reply, to learn personally the views of my several railway friends, and am told that these wheels will never be used in England for the following reasons:

"1st. They are never perfectly round, from the fact that castings do not shrink uniformly and if you will take 10 wheels of any make, and test them in a lathe you will find they are not perfectly round. Now in England a round wheel is essential, and although they wear into flat places, still no engineer would be justified in putting on a wheel in the first instance that was not round.

"2d. The cast wheels are too heavy, a 33 inch diameter passenger car wheel on the Pennsylvania Railroad weighing over 400 pounds.

"3d. The smallest wheels here are 33 inches diameter, and passenger wheels 48 inches diameter, and it is a query as to what such wheels would weigh, and if they can be made to such sizes. There is a belief that there is a difficulty in making large sizes, and 33 inches is regarded as a maximum with safety.

"The wheels are very severe and rigid upon the permanent way, and, at the same time, very noisy, which would be a fatal objection. Cast iron is only cast iron after all, and the maximum strength of the test is well known. It is a very questionable matter how a 45 inch diameter wheel would behave at the high speeds, and with the rigid frames of the vehicles as used here, for there are no bogies in use in this country under carriages (except the Pullman cars on the Midland). Anybody can break a chilled flange off a cast iron wheel with a 14 pound sledge hammer with a couple or three blows, and it is a questionable matter how they would stand.

"The Grand Trunk, of Canada, are throwing away all cast iron wheels and using wrought iron. Four hundred wheels recently came here from Toronto, all cast iron, for an Indian railway. Not one was sound, and all sent to scrap. For tramways they are, of course, all right. In Russia they are using mostly wrought iron with cast steel tires.

"It is a singular thing that engineers who have visited America should condemn the wheels there in use on all railways more than anything else."

ENGLAND, February, 1875.

"DEAR SIR: We are in receipt of your favor which we have read with attention, but its contents cause us very considerable surprise, as our experience has been quite the reverse of what you indicate. Instead of chilled wheels being likely to find favor in this country they were, perhaps, never more unfavorably regarded than at present; and, on the other hand, we have already executed a very large order of wrought iron wheels for Canada, which have now been running for nine months. These wheels have shown results never before attained by chilled wheels, having run 70,000 miles without showing any serious defect, or causing a single accident to the rolling stock of the company. While the engineer of the railway company informs us that the life of a chilled wheel is 15 years, or 50,000 miles.

"In fact, the results have been so satisfactory, and the change has already proved such a saving to the company, that we are confident in a very short time the whole of the rolling stock of the line in question will be converted, and we have little doubt other lines will follow their example."

I may add that the first of these letters is from a gentleman of great experience as a mechanical engineer, and who is thoroughly conversant with the feeling of railway men on the subject; and that the second is from one of, if not the, largest and best known makers of wrought iron wheels in the country.

Yours, truly, ALFRED EARNSHAW.

We will now take up some of the points made in these letters and consider them briefly:

In answer to the first objection to chilled wheels, that they are not round, we would say that when a first-class wheel is put in a lathe it will be found to be practically round. One of our railroad friends tried the experiment, and found that the cast passenger wheels, "when chucked in a lathe, would touch in from 16 to 18 different places," and the spaces between were not 1-32 of an inch out of true. Unless the wrought wheels are "skinned" with an emery wheel, they will hardly come any nearer to being truly round. When a cast wheel is not round the fault is not in the material but the maker. On many roads cast wheels are used which are absolutely true, the surface having been skinned by an emery wheel. A wheel of this kind is now at the car builders' rooms, in this city, which has made 150,000 miles and seems good for as much more. It is of the cushioned type, and would be superior both in truth of running and noiselessness to any rigid wrought wheel ever made.

In regard to the second point, it is only necessary to remark that, from the constant and disastrous breakages of wrought iron wheels during the past year or two, it would seem that an increase of weight would be desirable, if more strength could be secured thereby.

Thirdly, as to sizes. Thirty-three inches is as large as a wheel should be cast. Making them larger is simply a question of weight. Even the 48 inch passenger wheel could be replaced with a 33 inch wheel,

provided a road wished to make the experiment. The problem would not be a difficult one.

The following quotation from the remarks of an experienced railroad engineer, with regard to the weight of cast wheels, will be read with interest:

"The Pullman palace cars running on chilled cast wheels between New York and Chicago, a distance of about 1000 miles, are run through without rest, and often at speeds of 40 to 50 miles an hour. They make 12,000 miles a month. I have never heard of an accident to any of these cars occasioned by the breaking or failure of any of their wheels. This is probably the severest duty performed by cars on any railway in the world, and made particularly so by the terrible snow storms and low temperatures that occur in this country and Canada. To make assurance doubly sure in the use of the chilled wheels in this northern climate, they are made to weigh 325 pounds; but in more moderate climates, where ordinary gradients prevail, I have found wheels of 38 inches weighing 450 pounds to answer all requirements of speed, safety and endurance. Of course I allude to wheels made of well known brands of iron by well known makers of standing and reputation—men who never make cheap wheels—wheels that are in the end the very dearest that can be bought.

Our intelligent English critic further states that cast iron wheels are rigid and, as compared with wrought iron wheels, very severe upon the track. This may be characterized as "gammion." The wrought wheels have, practically, no more elasticity than the cast. He says, too: "Cast iron is only cast iron, after all"—a very wise and possibly witty remark, but one that does not bear upon the subject, because cast iron may be cast iron without being any approach to wheel metal.

"The strength of the test is well known."

That appears to be a willful misstatement.

Car wheel irons have not been tested so as to make the strength of the tests well known. Had they been known to the writer, he would never have referred to them, for, as the experiments made by Mr. Partridge show, their average strength is equal to, if not greater than, that of the English merchant irons. These tests were recently published in *The Iron Age*. Possibly the gentleman thinks he can break a piece out of the flange of a good cast wheel with a 14 pound sledge at the third blow. All we say is, we should like to see him try it. The following will give our readers some idea of the success he would have. In 1866 Mr. W. W. Evans took a set of chilled cast wheels to England, and one of them was carried to the North London Railway and broken up to show the depth of chill, strength and quality of iron. The following is Mr. Evans' account of the experiment:

It took 320 blows of two stout smiths, each with a 28 pound sledge, to break the first piece from this wheel, and as many more to break up the whole wheel from the boss. The first two smiths brought out to do the pounding laughed when they heard that it was cast iron, and said they would soon make the pieces fly, but they had to give it up, fagged out, and the perspiration pouring down their cheeks. Two others were called, and they would have given it up but for the encouragement I gave them and the promise of a guinea when they got the first piece out.

Certainly it would require pretty vigorous handling of a fourteen pound sledge to make much impression upon such a wheel, and wheels of this character are not, according to our experience, very rare. The following extract from a letter of Mr. Evans to our esteemed contemporary, the *Railroad Gazette*, gives the opinion of two of the principal Canadian railways, concerning American chilled wheels:

"They certainly have a duty to perform in this country and Canada, which for severity of climate in winter and for rough tracks on the breaking up of the frost in the spring is utterly unknown in England. Some years since Mr. W. A. Robinson, the English mechanical engineer of the Great Western Railway of Canada, put the life of the chilled cast iron wheels at 160,000 miles. In a letter now in my possession, dated August 9, 1869, written by Alex. M. Ross, Chief Engineer Grand Trunk Railway, he says: "Our experience in cast and wrought iron wheels has induced our giving a decided preference to the former. I have myself been instrumental to the introduction of the English pattern in wheels, and after two or three years' trials have been obliged to abandon them altogether."

This, too, on a road that the writer affirms has abandoned the use of cast wheels. In practice, a cast wheel never flies to pieces all at once, as is very common with English wheels, and the past severe winter has conclusively shown their ability to resist the efforts of extreme cold. During the month of January last only four wheels broke and caused accidents on the railroads of the United States, and during February nine. We think this a sufficient answer to the objection that they become dangerously brittle in winter.

It is possible that the Grand Trunk Co., of Canada, are discarding cast wheels and adopting wrought iron instead, but we have never heard of any such action on their part, and do not believe it is even contemplated.

Ignorance or something worse must have dictated the statement that 70,000 miles run in 9 months is a result that cast iron chilled wheels have not attained. There are so many hundreds of cases where chilled wheels have vastly exceeded these figures that we do not know what to think of the person who makes such a statement.

We have a record of five wheels under Pullman cars that have each made upwards of 100,000 miles, and one 90,000 miles, before they were condemned, and not one of them was condemned for breakage. They were literally worn out, the tread showing the effects of the break-shoes. Messrs. C. D. & F. Fox recently read a very interesting paper before the Institution of Civil Engineers of England on the "Pennsylvania Railroad and American Railway Construction." We take the following figures, based upon a part of what they say relative to the use and wear of chilled wheels as compared with steel tired wheels, from another portion of Mr. Evans' letter:

They say that they can run 100,000 miles and can wear out at least three steel tired wheels. They would be a great economy if they wore out one steel-tired wheel, for the cast wheels cost £4 and the steel wheels £10 each. Taking the statement of the Messrs. Fox to be true, let us see what the saving would be in a year to the London & Northwestern Railway by the use of the chilled cast wheels instead of the steel-tired wheels.

The returns to Parliament for the year 1873 shows the rolling stock of the London & Northwestern Railroad to be as follows:

Locomotives.....	2,060
Passenger carriages and vans.....	4,745
Goods wagons of all kinds.....	38,218

The locomotives averaged 15,415 miles run. The passenger cars and vans are estimated to run 4000 miles a month, the goods wagons say 1000 miles a month. For brevity we will assume all of them to have four wheels each, including tenders of locomotives, and call the rolling stock 2000 locomotives, 4000 carriages and vans, and 38,000 wagons.

To wear out one set of chilled wheels, the life being 100,000 miles.

The locomotives would, at 15,000 miles a year, run 6 2/3 years.

The passenger carriages and vans, at 4000 miles a month, 2 1/2 years.

The goods wagons, at 1000 miles a month, 8 1/2 years.

The wear of the steel-tired wheels would, according to the Messrs. Fox, be only one-third of the times mentioned above.

The cost of the chilled wheels for one year would be as follows:

8,000 wheels in 2000 locomotive tenders at £1 per wheel—	£8,000
2 1/2 years.....	£24,000

16,000 wheels in 4000 carriages and vans, at £1 per wheel—

2 1/2 years.....	£48,000
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132,000 wheels in 38,000 wagons, at £1 per wheel—

8 1/2 years.....	£111,111
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Total one year.....

£80,111	
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The cost of the steel-tired wheels for one year would be as follows:

8,000 wheels in 2000 locomotive tenders, at £10 per wheel—	£80,000
2 1/2 years.....	£240,000

16,000 wheels in 4000 carriages and vans, at £10 per wheel—

2 1/2 years.....	£480,000
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132,000 wheels in 38,000 wagons, at £10 per wheel—

8 1/2 years.....	£1,111,111
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Total one year.....

£1,931,111	
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Deduct cost of cast chilled wheels.....

£80,111	
---------	--

Saving in one year.....

£1,850,999	
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From the above, taking the Messrs. Fox's figures and data to be true, the saving by using the chilled cast wheels would appear to be £355,816 sterling on this great railway for one year, to say nothing of the chilled cast wheel being much safer than the steel-tired wheel. We do not think with Messrs. Fox that one cast wheel will outlast at least three steel-tired wheels, but we heartily endorse Mr. Evans when he says of the cast wheel that it is a safe wheel, "and that, when made of 'first-class iron, it will have a life of '100,000 miles or more, I know to be a 'fact. I have traveled many thousand 'miles in trains having chilled cast wheels, 'but to this day I have never seen a wheel 'broken while running, nor have I ever 'heard of a wheel made of the best iron 'breaking while running."

Captain Tyler, in his report to the stock and bond holders of the Erie Railway, endorses the American wheel in the following strong terms. We have ourselves made extracts from the records from which these mileages were made up, and find them even more favorable than Captain Tyler's report would show:

Some interesting statistics are recorded in this department in regard to the durability of cast iron wheel used in the bogie trucks, under the leading ends of the engines, under the tenders, and under the passenger, freight or other cars.

The wheels used for these various purposes are generally of the same character. They are of cast iron, with a sufficient proportion of white iron to enable the chill to sink to an average depth of half an inch into the treads and flanges; and the question is the more interesting, inasmuch as wheels of this description are in almost universal employment in America, though they are not regarded with favor in the United Kingdom. They cost about \$30 apiece when new. They weigh about 500 pounds for a wheel of 33 inches in diameter, which is principally employed, and they are worth from \$7 to \$10 apiece when worn out or defective, according to the varying prices of old iron.

After speaking of the great difference which he finds in the durability of wheels from different makers, he says in regard to passenger cars wheels of from 26 to 33 inches diameter, that the best result from the wheels of good manufacturers was an average life of 36 months and 16 days:

"As regards the wheels under the engine trucks, the average from four manufacturers for the durability of such wheels has been respectively 14 months 1 day, 14 months 23 days, 15 months 8 days, and 24 months 3 days. It is impossible to determine precisely the mileage of the cars for the periods above stated; but a wheel lasting three years would probably run 80,000 miles during that period. The mileage of the wheels under the engines can be more accurately ascertained, and may be considered to amount for two years and one month to 55,

000 miles. The average life therefore of a cast iron car wheel from the best makers, may be taken to be about 80,000 miles, and of a similar cast iron wheel under an engine truck about 55,000 miles. The durability of these and other wheels depends, of course, on the speed at which they run, the loads which they carry, and the description of track on which they travel, as well as upon the materials of which they are composed, and the care employed in their manufacture."

The engineer who says that the life of a cast wheel is only 50,000 miles, must be ignorant of the fact that there are wheel foundries in the country willing to warrant all the wheels they sell to run 50,000 miles, and replace them if they fail before they have made such a mileage. The average will, of course, be much higher. As the Grand Trunk Railroad, to which the writer refers, is running, according to published statistics, upward of 50,000 cast iron wheels, the idea that the whole of the stock in a short time will be running on wrought iron wheels is preposterous. It would be unparalleled in the history of American railroading. In short, the gentlemen who speak so confidently of the defects of American wheels, evidently know nothing whatever about them, and do not care to learn the facts. We admire English conservatism, but when it takes the shape of opposition to improvement and progress, growing out of ignorant and unreasoning prejudice in favor of established methods, it does not command unqualified respect.

The Reign of Terror in the Anthracite Region.

The Philadelphia *North American*, always zealous in its defense of everything local, and ever restive under criticism from whatever source, says of the strikes now maintained in the anthracite region:

The anthracite coal conflict in Pennsylvania occasions a widespread discussion in the Northern press, and we are sorry to say that the impression prevails extensively that the strikes of the coal miners are annually arranged by secret agreement with the operators, for the purpose of keeping up the price of coal, which we are sure is not the case. The miners are largely foreigners, and bring with them all the well-known tendencies to organize trade associations and dictate the wages of labor. When the mines were entirely worked by individuals or firms, the state of affairs was the same as now, the only difference at present being that the Reading Railroad Company is the one conspicuous mark to be attacked. In some quarters we observe a studied effort to make Pennsylvania suffer for this trouble, though how far as Philadelphia is concerned, her immense manufactures make her interest in the coal trade the same as that of New York and New England. The capitalists in the coal trade would willingly do anything reasonably to abolish strikes.

That the strikes of the coal miners are annually arranged by secret agreement between the operators and the miners for the purpose of keeping up the price of coal, is not probable. We do not so believe, nor have we ever stated that such was our opinion. But we do believe that in many instances during the past ten years the operators have adopted a policy toward the miners which they knew would bring about a strike, and that, when work has been stopped, they have been content to let their mines stand idle for weeks and months at a time, neglecting in all but exceptional instances the adoption of measures for their own protection against trade union tyranny. No one will deny that, in the long run, these strikes have been profitable to the operators, especially to the great companies which have gradually, but certainly, acquired practical monopolies of the business of the different anthracite districts. Accumulated stocks have been run off at advanced prices, the work of a year has been crowded into a few months, and the supply has been kept down to the level of the demand. The fact is, the anthracite regions are oversupplied with labor, and in seven months the companies can mine a year's supply. No doubt the companies would rather work their mines moderately the year round than drive them to their capacity part of the time and stand idle the rest. But the miners are not accommodating. Their associations wield a tremendous power, and if it be that, in times past, the operators have encouraged strikes, it is now evident to them, as to all intelligent persons, that in so doing they have been instrumental in calling up a "Frankenstein" that will not down at their bidding. What the issue of the conflict between labor and capital in the anthracite region will be, no one can tell. We admit the existence there of a state of affairs which cannot be contemplated without a shudder, but the danger is only increased by postponing the conflict which must sooner or later take place between the miners on the one hand and the representatives of law and order on the other. It is a cowardly policy, at best, which the companies have adopted, in protecting their own interests at the expense of the interests of those of the whole country, especially the State of Pennsylvania. In an article on the policy of the Reading Rail-

road Company, published in a recent issue, we showed to what extent the manufacturers of the Schuylkill Valley were made to suffer for the benefit of that corporation; and the remedy we then suggested is the only one which seems to give a promise of relief from the evils which now afflict the coal trade. When the companies have made an honest effort to emancipate themselves from the control of the miners' unions, and to protect independent labor against the ruffians who now maintain in the coal regions a perpetual reign of terror, it will be time enough for the Pennsylvania papers to apologize for the condition of affairs which exists there.

Iron Ships.

For a long time the American people have felt somewhat discouraged about the future of our iron shipbuilding, because we are not all the time building new ships for trans-oceanic service, and because it is commonly supposed that, in the matter of cost, there is a great difference in favor of British bottoms and against American. There is, however, no warrant for gloomy predictions respecting the future of this most promising industry. We have built, and are annually building, a great number of iron ships of large size and excellent quality, some for service on the Atlantic and Pacific, some to ply to South and Central American ports, and some for the coasting trade. All things considered, these ships are cheaper than British ships. They cost somewhat more per ton to build than is paid for average British iron ships, but the material is vastly better, the necessary allowance for repairs is much smaller, and the average service is longer—statements which we have repeatedly substantiated by facts and figures in these columns.

In spite of all this, there remains a certain measure of fearfulness that we shall not be able to compete with foreign builders, because we have to make a better article and charge a higher price for it. Consequently, we find that, with the dawn of a new era in American shipbuilding, there is very little hope of successful competition with foreign shipwrights among those not immediately connected with the business. The following extracts, from Ryland's *Iron Trade Circular*, upon the shipbuilding trade in England, if considered in their true bearing, will throw a new light upon the subject, and show that it is by no means a hopeless task to enter a large market with a good article, even though it be much higher in price than those sold by our competitors: "At one time it was taken as orthodox that shipbuilding had entirely abandoned the Mersey, and taken refuge on the east coast and on the Clyde. And for some time, indeed, such was the case, and even Whitehaven was called into requisition for shipbuilding purposes by one of the first ship owners of Liverpool." It is gradually, however, returning. Liverpool has gained by this desertion, and work which was formerly done elsewhere "is now completed on the Mersey—both sides of the river sharing the patronage of one of the largest steamship companies in the port." The writer then goes on to speak of the important question: How is it that the east coast shipbuilders, after having done so much to take away shipbuilding from Liverpool, cannot now, literally speaking, hold their own? It is not because they cannot build ships; they do know how to build them; but because Liverpool ship owners find that they can have better vessels built on the Mersey, though somewhat dearer, than they can on the east coast.

The writer says: "For many years the Clyde monopolized a good deal of the shipbuilding trade of the Mersey. The most part—indeed, almost the whole—of the large ocean-going steamers were built there, and some of them are still being constructed there; but of late Liverpool has obtained a portion of the trade. This is a singular fact, for iron ships are ten shillings per ton dearer in Liverpool than on the Clyde." Here is the fact for thinking men to ponder over. Liverpool obtains a share of the trade at ten shillings more per ton than her rival asks. Evidently the thing is possible, and we need not despair of finding a market for our vessels which are confessedly better than those built abroad.

Practically, there is no reason why Great Britain should hold her own in the matter of iron shipbuilding against American competition, any more than why the east coast and the Clyde should hold their own against the Mersey—if, indeed, as much. A large part of the business of the British ship yards consists in the filling of foreign orders for tonnage: when the fact is generally understood that we have, in this country, the materials, facilities and skill for building iron ships of any size, excellent in all their appointments and, all things considered, cheaper than British ships built to the same plans and

specifications, because better in material and workmanship, foreign orders will come here instead of going to England. The secret of the "cheapness" of cheap British ships, is easily told. The last annual report of the United Society of Boiler Makers and Iron Shipbuilders, explains the reason. It speaks of builders who take contracts at a price far below the market value, and to execute the work thus undertaken they employ men as mechanics who never served any apprenticeship—and who only came, to the trade years after they arrived at manhood—because builders can procure their services at a small wage. Of course the work done by these men must be inferior, and it needs not a second thought to see that, if this system were abolished, many vessels would be much better built than at present, and that fewer would mysteriously disappear, without leaving behind them so much as a corked bottle containing the story of their fate.

Inspection of Plans for Plumbing Work.

Superintendent Day, of the Sanitary Bureau, presented a long communication at the last meeting of the Board of Health, relating chiefly to the subject of house drainage. We quote the following from a report of the meeting:

"Mr. Day urgently recommended as a sanitary measure, that the Board of Health solicit the co-operation of the Department of Public Buildings in making it imperative upon architects to submit to the Superintendent of Building specifications of the plumbing in all houses in process of construction, a copy of which should be on file in the Sanitary Bureau for the use of citizens and inspectors." The communication concludes: "Some sanitary lessons would thus be taught the plumbers and architects, the attention of the public would be directed to this most important subject, and the work of the inspectors would be greatly facilitated."

At first sight this appears to be a very plausible proposition, and one which would be likely to produce much good. Upon a little examination, however, its utter uselessness becomes apparent. In the first place, few architects are sufficiently well acquainted with the plumbing business in its practical aspect to be able to draw up specifications for plumbing work which would be of any value to a good workman, or that would prevent a dishonest one from doing a bad job. In the next place, defects in plumbing work are not of a character that appear in plans and specifications. The architect may have the best plans in the world, and they might pass the most rigid inspection, but defects in workmanship not contemplated by the builder may defeat completely the object sought. What is needed to insure reform is an intelligent co-operation between builders and architects on the one hand and plumbers on the other. Moreover, such a collection of plans as that contemplated would be of but little use for consultation or reference by those interested in the subject. They are, as the rule, of no value except as indicating the number of baths, water closets, wash basins, sinks, wash tubs, &c., and the specifications are usually very loosely drawn according to stereotyped forms long in use. Again, if it is intended that such plans should be examined and passed upon, what guaranty have we that the inspector upon whom this duty would devolve will be an expert in sanitary science and practical plumbing?

There is no occasion for any legislative tinkering with the subject of house drainage. It is with the plumbing trade as with all other mechanical arts—the builder who wants good work done with good materials, can have what he wants if he is willing to pay a fair price for it. If he seeks to screw the price down below the actual cost of good materials and skillful workmanship, he cannot expect a satisfactory job. Until those who buy and lease houses shall demand that the plumbing work be well done in every detail, we shall have no reform in the evils to which Superintendent Day calls attention. They are practically beyond the reach of statute and ordinance.

Clock Making in the Black Forest.

A French contemporary gives the following interesting account of clock-making in the Black Forest, which industry is, at the present day, concentrated in Dittlshausen, Eisenach, Furtwangen, St. Georges, Leutkirch, Neustadt, Friburg, Villigen and Rohzenbach. Essentially a domestic occupation at its origin, and employing whole families, it is only thirty years since watch and clock-making have been carried on in factories. Leutkirch produces a great number of what are called Parisian watches, the zinc for the case being sent from Paris and gilded here. The cases, wheels, and all the necessary items are made separately, and the works are divided into various kinds; the separate pieces are carried into the workshops, where they are put together, when the clocks are successively mounted, tested and regulated. The different sorts of clocks manufactured in the

Black Forest comprise—The clocks with weights; clocks in cases, amongst which are 12-hour clocks, 24-hour clocks, 8-day clocks, clocks which go for a month, tower clocks, regulators, the spring clocks of English and French construction, ship clocks and figure clocks, amongst which may be classed cuckoo and trumpet clocks. The importance of this branch of industry will be seen by the following figures: In 1871 the Black Forest numbered 1429 free manufacturers of clocks and watches, employing 7536 hands, independent of women and children, who were occupied in the small details; 13,000 persons lived by this industry alone. The number of articles produced had risen in 1874 to 1,800,000, of which 100,000 were of first-class workmanship. The total represented a value of ten million florins. The most curious branch of this art is without exception the manufacture of automaton clocks, and the ingenuity of the Germans has produced some wonderful mechanical clocks. The great musical clocks are called orchestrals. The development of this art is due to Vaucanson, who made the first at Blois. In the manufacture of these clocks the work is not divided, at least for the essential parts. The masters execute nearly all in their workshops, with the exception of the metallic pipes. Last year there were 32 masters and 224 hands employed in making these clocks. The great factories of orchestral clocks produce instruments of five and six registers, of which the price varies from 1000 to 20,000fr. These clocks are in great demand in America and Russia.

American and British Patent Law Reform.*

(Continued.)

American patent law is derived from the English, but the two have diverged in many essential respects, until marked differences exist not only in the respective statutes, but in the tenor of judicial decisions. The English law is more strict in its requirements concerning title and descriptions of inventions than our own, but English courts have given broader scope to the word "invention" than has here been the case. In England no examination is made by the government preliminary to the issue of a patent, and hence patents are sometimes granted on old devices. In this country examinations are made, but often so carelessly that unpatentable matter is protected, and still more frequently, so capriciously that applications are unjustly rejected. The English practice requires no models, but the government charges are high. The United States Patent Office requires but moderate fees, but insists on models that in thousands of cases have made the actual cost of an application for a patent count up to much more than that of an English one. The English practice throws the entire responsibility of properly preparing the specification and claims upon the inventor or his attorney, and leaves all judgment thereon to the courts. The American Patent Office assumes to decide what may or may not be claimed, and, during recent years, has shown a constantly increasing tendency to trench upon the province of the bench, and at least one instance is on record where the commissioner absolutely refused to issue a patent after the Supreme Court of the District of Columbia had, on appeal, decided that the applicant was legally entitled to it. It is manifest, therefore, that while based on the same ethical principle of justice, having in view the same advantage to the public, and showing the same beneficial results upon the advancement of useful arts and of the civilization based thereon, the two codes are so widely different in their details that reform in one must be by means quite different from those essential to reform in the other. Each needs a patent law that will encourage inventors to the utmost, and this, too, by means that shall be of equally apparent advantage to the public; this can only be secured by lopping off from each the provisions that it has so far outgrown that they remain only as harmful excrescences, and by the adoption by each from the other of those features, and none other, normally coincident with its established operation. The fact that a strong effort will probably be made at the next session of Congress, by different parties holding widely varying views, to effect radical changes in the American Patent Law, lends to the subject exceptional interest and importance at the present time, while the equally significant fact that the Lord Chancellor of England has, within the past month, brought before Parliament a bill proposing the most decided changes in the British law ever yet suggested, makes their consideration of scarcely less importance than that of our own. For the American inventor, manufacturer and engineer has a direct and positive interest in the patent system of England, and his British brother is equally concerned with ours. An invention that succeeds in Manchester, Birmingham or Sheffield, must, in a few months or years, find its way into the workshops of New York, Newark and Philadelphia, and one devised and completed here, will, if successful, find an equal, perhaps a greater, market abroad. The laws of trade will carry an improvement in any art or industry to the place where it is most needed, and equity demands that it should be paid by the community that he benefits, whether here or across the sea. Hence, reform in American patent law touches not only our own interests, but the interests of the industries in other lands. Reform in British patent law affects not alone those for whom it is specially intended, but American inventors as well. Let us proceed, therefore, to a brief consideration, firstly, of the defects of our own system and the most obvious remedies, and, secondly, of the practical bearing of the projected changes in the English Law.

Section 24 of the United States law of 1870 recites that "any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned, may upon payment of the duty required by law, and other due proceedings had, obtain a patent therefor." This appears comprehensive enough to include any practical improvement in any art or industry. But the courts have restricted the meaning of the statute, as the patent office has in numerous instances restricted that of judicial decisions, and many kinds of improvements, new

and useful both, are now excluded from protection. Thus the substitution of one material for another in the structure of an article of manufacture, as porcelain for metal in the fabrication of door knobs, although a great improvement in the art or industry, was declared a matter of "judgment" and not "invention." So, also, in new packages of staple articles that are novel in the trade, and productive of improved results. Recently a New York grocer applied for a patent on an improved package of lilies, by which the cost of the substance to the consumer was diminished one-half and the sale increased 1000 per cent., and was rejected on the same plea. The spirit, if not the letter, of the law, intends that all improvements shall be patented both to reward the inventor and to encourage others to invention, that the public may ultimately reap the benefit. I can see no reason why improvements such as just mentioned should be excluded from protection. The English bench has declared that increased utility, taken in connection with even so slight a change as the substitution of a gas flame for the flame of an oil lamp, removing the loose fibers from lace was a worthy subject for a patent, and has even decided that, when improved results are achieved thereby, the substitution of a well known sheet metal in place of another well known sheet metal for sheathing ships, came within the intent and policy of the law, and was therefore deserving of protection. Our statute should be so phrased and worded as to broaden its interpretation back to the original standard, so that any improvement, new and useful to the art, trade or manufacture to which it relates, may be secured to the inventor without the cavil that it required "judgment" only and not invention. The policy of the law looks to results by patenting the means, here and there, which results are obtained, and the inventor should be paid by a patent for the value of any bona fide improvement, no matter how conceived, that he gives to the public.

I know of no better expression, among all the fifty-eight patent laws of the world, of what should constitute a patentable subject matter than is found in the statute of Ceylon, which says: "The word invention shall include an improvement. The word manufacture shall be deemed to include any art, process or manner of producing, preparing or making an article, and also any article prepared or produced by manufacture." If this definition of "manufacture" were embraced in the act of 1870, it would remedy an error of no small proportions to which the narrowing dicta of the courts and of the patent office have given rise.

The practice of the American patent office differs from that of almost every other in the system of examinations to which I have heretofore referred. Whatever the demerits of this system, and it causes hundreds, and perhaps thousands, of erroneous rejections every year, it has probably been too firmly fastened upon the patent system of the country to permit its real work to be safely either to inventors or manufacturers. Our patent jurisprudence has become so identified with the practice, that to bear its errors will incur less mischief than its abolition would be likely to produce. Reform in the treatment of applications must come primarily from change in the law, as just herein remarked, and in a secondary, but almost equally important degree, from a firmer discipline in the patent office, a higher standard of requirements and efficiency in the examining staff, and a ratio of remuneration that will make it an object for the most efficient of the examiners to remain permanently in the patent office, instead of seeking, as most of them now do, to secure more remunerative positions outside at the earliest possible moment. But while the system of examinations, however improved, must of necessity be retained, its present concomitant, the requirement of models, should be swept away. Models are not required in Great Britain, France, Belgium, or other European countries, and their retention as preliminary to the examination of an American application is an imposition as uncalled for as it is unjust. It is claimed for the practice that models assist the examiners to a clearer comprehension of the peculiarities of each invention, but this is true on only a small percentage of cases, and in these exceptional instances the saving of labor to the examiner is infinitesimal in comparison with the cost to the applicant. Moreover, the model makes no part of the patent. The latter is required by law to be apprehensible from its drawing and description, and it is to these that the public at large owes its knowledge and understanding of the invention, and there is no reason why these should not suffice to enable the examiner to understand the matter before him, if they are sufficient for those engaged in the occupation and pursuit to which it relates. I am aware that a commissioner has declared that confusion will arise in cases of appeal and of interference if models are not shown to place the invention in perspective before the eye. Even if this is the case, which I am disposed to doubt, such instances are but one in a hundred of the entire number of applications before the office, and inventors, as a class, should not be thus taxed to meet the exigencies of these exceptions. Moreover, these latter could be fully met on occasion by the temporary use of models or working machines as exhibits. The harshness of the law requiring of models best illustrates the desirability of doing away with it. One gentleman, the proprietor of a fire arm, informs me that the model cost him one thousand dollars, making the expense of the application at least fifteen times as great as it should have been. The tax is hardly less onerous with many simpler classes of mechanism. I know of one who filed and paid an application for a patent on a coffee mill of improved construction at a time, when, in some cases, the commissioner exercised the right of dispensing with models. But the request was denied in this instance, and the inventor, too poor to pay for the patterns, castings and fitting up, was compelled to let the application lapse; whereas, could he have secured his patent without a model he would have had the chance at least of disposing of an interest in it for funds to work the improvement. But as the patent office wished another coffee mill model to put in its glass cabinets, it lost the final government fee of twenty dollars, the inventor lost his application, and the public lost an improvement that in all probability would have been of practical and substantial value. Our law should be so amended as to sweep away this uncalled for tax of models, which is of no use to the State, but is a clog to the efforts of inventors and a drag to the progress of invention.

This paper has already exceeded its allotted limits, and I must sketch briefly the remaining points in which our American patent jurisprudence should be reformed. Foremost among them is that clause of the Act of 1870 which shuts off appeal from the commissioner in interference cases, appeals in these having previously been made to the Supreme Court of the District of Columbia, for there is neither occasion for nor expediency in permitting ministerial officers to exercise the functions of a court of last resort. And in making this change back to the old practice, provision should be made for the execution of the decisions of the bench, in the event of their disobedience by the commissioner. The fact that the commissioner is held to be authorized to suspend the issue of any patent at his own discretion, for any cause, is an anomaly that cannot be too quickly rectified. There are other respects in which the statute could be amended in the interests of equity and

justice. But the reform most needed should be made first, and anything like wholesale or revolutionary change is to be deprecated. A broader scope given to the terms "invention" and "improvement," the doing away with the requirement of models, and the clear and acknowledged subjection of the patent office to the courts, will frame our patent law into a system having more of merit and less of defect than that of any other country. But the friends of an equitable patent system are called upon to watch closely the progress of legislation. During five years past the patent office has followed an erroneous construction of the law, in rejecting applications for patents, by other applications previously rejected. During the past few months the United States Courts have upset this. The Board of Appeal, a tribunal within the office, has declared it wrongful and illegal, and the commissioner has been compelled by these precedents to take the same view. A bill providing for the restoration of the old wrongful practice was in the hands of the Senate Committee at the close of the last session of Congress, and was at one time agreed upon by the Committee, but fortunately was withheld by them, and consequently came to naught. The commissioner has assumed the right of writing to rejected applicants for ex-parte testimony to defeat new applicants, a proceeding for which I know of no warrant in the existing laws, and one that I believe is contrary to equity and common sense. But as this will probably be decided illegal, as soon as some inventor has courage to bring it before the courts, the practice may perhaps be dropped without legislation. One thing, however, should be done without delay. The archives of rejected cases should be closed—be made secret—otherwise there is no guarantee that parties may not examine them, take inventions described in them, and apply for patents on them. This closing of the records of rejected cases, many of them unjustly rejected, and hence still the property of their inventors, is a matter within the discretion of the commissioner, and needs no enactment of Congress to permit it to be done.

I have spoken of the characteristic features of the British patent law as it now stands on the statute books. The bill of the Lord Chancellor, Lord Cairns, now before Parliament, proposes radical changes, that if attempted will surprise in their operation the proposer of them. The bill contemplates preliminary examinations after the manner of the United States Patent Office, but provides that the examiners shall not be more than four in number. It will be impossible for this small number of examiners to make examinations of all the cases, say seventy-five or more a week, that will come before them. An incomplete examination will not prevent the issue of worthless patents, but unless the gifts of the British patent department are different and better than those of the United States Patent Office, such an examination will entail the rejection of many meritorious applications on frivolous and hypercritical grounds, involve an increased expense to inventors from the necessity of appeals, arguments and amendments, etc., and restrict the scope of many patents issued to less than in strict justice they should be allowed to cover. It should be remembered that the American system is fixed upon us like the old man of the mountain on Sinbad's back, it cannot be shaken off; but Great Britain has no such complex machinery to adjudicate upon every invention before it is called in question, will gain nothing by adopting the plan. Already in this country a large proportion of those well informed in patent practice, believe that we would be better off if the system of examinations was done away with; and, although I believe that its retention is the best choice between two evils, I have never in fifteen years familiarity with its practical workings, seen enough of merit in it to recommend its adoption in any country where it has not yet been suffered to take root. And it must be remembered that at the same reason for its adoption does not exist in England as exists for its continuance here. In England, all patents from the earliest times to the issues of last week are published, printed in full, may be examined at will, and copies of any one obtained at prices ranging from a penny to a sixpence, or a trifle more, so that an inventor can examine for himself and decide upon the novelty of his invention without the assistance of the government. But in this country the patent office has not even the claims of the patents from 1790 to 1849, and the record of sixty years is therefore practically closed to the inventor, although liable to be brought to bear against his claim at any time. The patent office reports from 1848 to 1860 contain the claims and minute engravings of the patents granted during the interval mentioned, but these are imperfect, and afford no full information by which the true scope of an invention in any given instance can be fairly judged. The reports for 1870 and 1871 have engravings, and nine times out of ten afford no definite clue to the nature of an invention. From and inclusive of the year 1872 the patent office has issued certified copies of the current issue of patents for each month, bound in volumes and distributed to the more important libraries throughout the country. The American inventor, therefore, or what amounts to the same thing, his attorney, has no means of examining for himself, unless he chooses to make a journey to Washington for the purpose. If all American patents were published and accessible as all English ones are, and as those of this country have been during the years last past, we could adopt the British system of dispensing with examinations better than they can be now. I do not propose, of course, of making the restricting effect of the examining system is frequently shown by the narrower scope of an American patent by comparison with the English one on the same invention, equally valid, and broadened by a clearer appreciation of the ethics of the patent law than the United States Patent Office is disposed to exercise.

Another innovation proposed by the new bill brought forward by the Lord Chancellor is the granting of some patents for a term of seven years, and others for fourteen. The term is to be longer or shorter according to the utility of the invention, and this is to be decided by the examiners, assisted by referees. But the Lord Chancellor does not stop here. The patent may be revoked at any time after two years from its date, if the patentee has not put the invention in practice, or if he has not made any step towards its introduction, such licenses are not granted on terms considered reasonable by the Lord Chancellor. How the Lord Chancellor would become competent to decide upon the purely business and commercial question of the value of a license to make, use or sell each one of the thousands of inventions annually sought to be introduced in Great Britain, does not appear. It is hardly possible that the bench, so impracticable should receive the approval of the British Parliament or the sanction of the British industrial public. With all its defects, the present law is a hundred fold better, and it is a matter of gratification that the projected bill meets with the decided though respectfully expressed condemnation of the leading English technical journals. Modification in matters of detail, not radical change in principle or practice, is all that is needed to secure the full efficiency of the British patent law, and a continuance of that constant advancement in the applied sciences that sprang directly from her first adoption of the system, and has supplied her industrial arts with constantly improving aids to labor for more than 250 years.

*Paper read before the Polytechnic Association of the American Institute, Thursday evening, March 11th, 1875, by James A. Whitney.

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Pattern No. 486, Black Finish.



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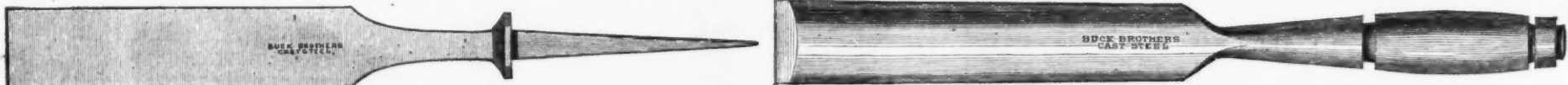
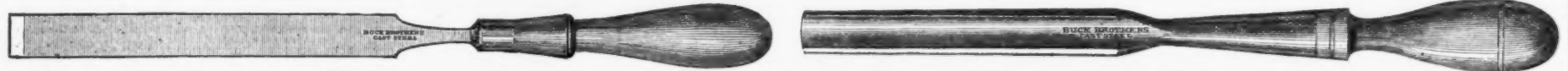
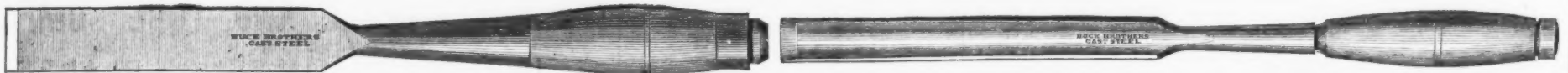
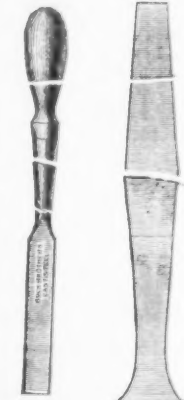
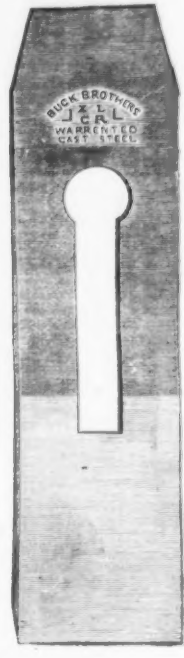
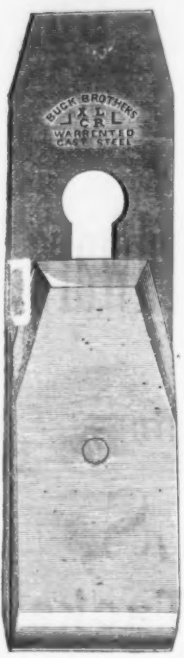
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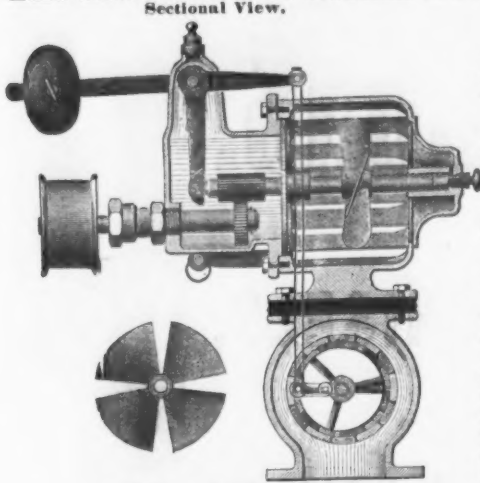


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A positive saving in Steam of from 10 to 20 per cent. over any other Governor in use.

This Governor possesses no characteristics in common with others, either in principle or operation. We refrain, therefore, from entering into comparisons. The Centrifugal or Ball Principle is entirely abandoned in this invention, and the valve lever is sustained with the same velocity in one position as another. No matter how great, violent or sudden may be the changes of load, we warrant it to

Absolutely Govern the Engine,

which will run uninfluenced by the varying pressure of steam, be it thirty or eighty pounds. In a moment's time the revolutions of the driving wheel can be changed to exactly the speed required without stopping any of the mechanism, remaining perfectly governed wherever set.

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Hungarian, Cigar Box and Chair Nails, Boat Nails of Copper or Iron.

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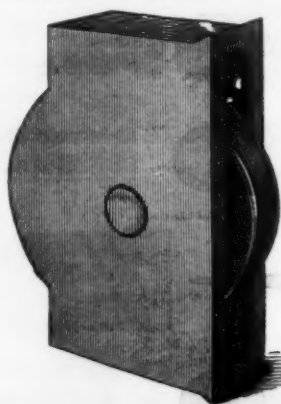
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THE DAVIS LEVEL AND TOOL COMPANY,
Manufacturers of
IMPROVED IRON BENCH PLANES.

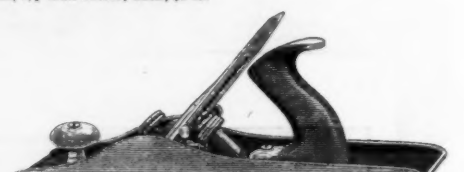
Patented January 2, 1872.
These Planes are made in a workmanlike manner, and each plane is fully warranted. The advantages of these Planes over all others are claimed to be in the simplicity of construction and the convenience of applying Moulson's, Butcher's or any ordinary iron, and the manner in which they are adjusted to the stock, which will be readily seen by any ordinary mechanic. These Planes are subject to the most rigid inspection, and each Plane is thoroughly tested in all its working points in every respect. For the adjustment of these Plane Irons no wrench, screw driver or hammer is required. After the Plane Iron is placed in position it may be readily adjusted to any desired thickness of shaving, simply by turning the thumb nut up or down, as the case may require.



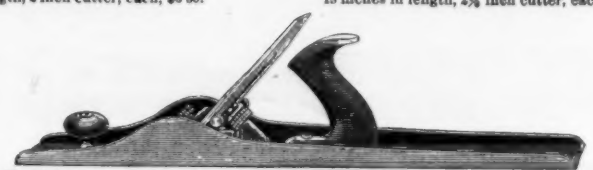
No. 43. Iron Block Plane.
6 inches in length, 1 1/2 inch cutter, each, \$1.00.



No. 44. Iron Smooth Plane.
6 inches in length, 2 inch cutter, each, \$3.50.



No. 45. Iron Jack Plane.
15 inches in length, 2 1/2 inch cutter, each, \$4.00.



No. 46. Iron Jointer Plane.
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CLIPPER SCYTHES,
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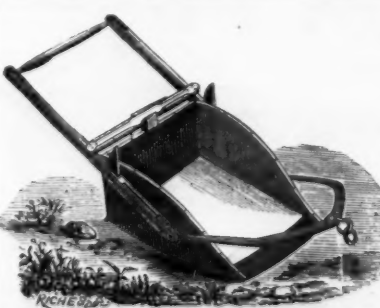
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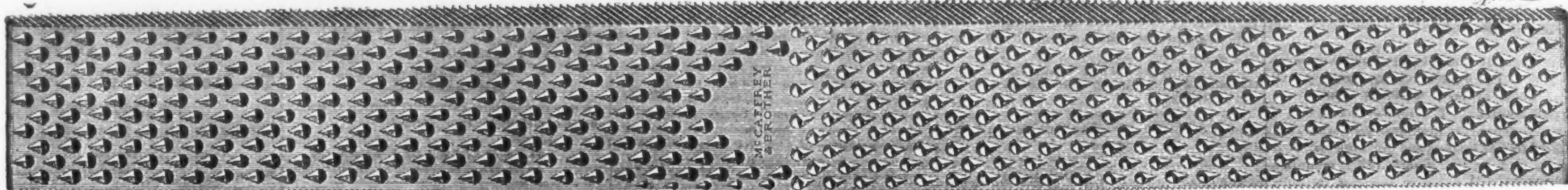


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Double Horse Rasp



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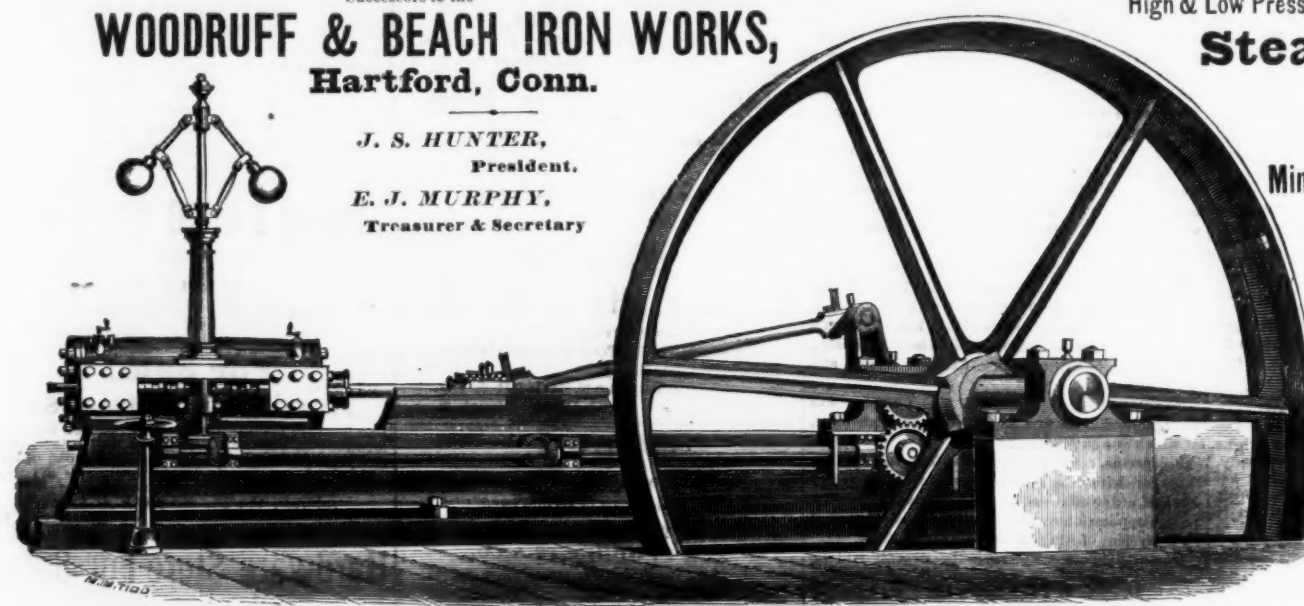
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High & Low Pressure Marine & Stationary
Steam Engines

AND
Boilers,
Mining, Powder and Paper Mill
Machinery,

And every Variety of Iron and Com-
position Castings made
to order.



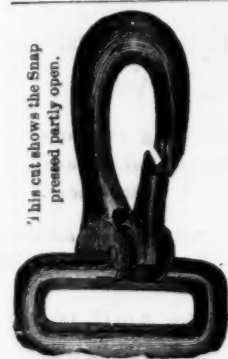
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Engines manufactured at these works,
and are a sufficient guarantee of our
capacity for doing first-class work,
viz.: The Pumping Engines in the
cities of Brooklyn, N. Y.; St. Louis,
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Charlestown, Mass., and Norfolk, Va.
Navy Yards, and the engines in the
U. S. Steam Sloop of War Michigan,
Kearsage, Manitou, Minnetonka and
Piscataqua, and the Gun Boats Cayuga,
Pequot, and Nipsic, the Govern-
ment Transports Dudley Buck and
Geo. C. Collins, and the Steamships
America and United States. Also the
large Horizontal Engine for the new
Plate Mill of the Bay State Iron Co.

man holding a short lever in each hand, and moving them as nearly as he could in accordance with the oscillations of the ship, and it can scarcely be doubted by those who saw the operation that with a little practice the desired object will be fully accomplished. It was the opinion of Mr. Reed, however, and of Mr. Bessemer's representative, who was likewise on board, that these levers were not arranged in the best manner possible for the purpose, and that a slight modification in them may be made with advantage, with the view, not of increasing the power of the apparatus (which seems to be quite ample), but with the object of enabling the manipulator to work the governing valves of the machinery in more immediate accordance with the movements of the ship. I must say, however, that although the handling of the machinery was from this cause somewhat imperfect, it was evident that this was more due to the inexperience of the man who had to work the levers for the first time in the ship at sea than to any defect of the machinery itself. It was the opinion of the officers present that had the rolling of the ship been heavier, the comparative steadiness of the saloon would have been more easily secured. As regards the Bessemer saloon, therefore, it appeared to me that the success, if not quite all that could be desired, was more than could have been fairly expected at the very first sea trial made of it. Certainly a seat in the handsome saloon worked by this machinery was even today almost entirely free from the objectionable features of a Channel passage in one of the smaller vessels. The saloon itself is very strongly and handsomely built, and its furniture and decorations in carved oak are in good taste.

Superior Castings.—We saw at the works of Mr. Cyrus Currier, at Newark, on Thursday last, two specimens of cast iron work which eclipsed anything of the kind we had previously seen. They were made from No. 1 Leeseport iron, treated with cherry-heat welding compound. The compound was put in the ladle, in the proportion of five ounces to the hundredweight of metal, and the iron was run in upon it. After the ebullition had ceased the metal was skimmed, and poured in the usual manner. A careful examination of the planed surfaces of these castings failed to reveal any flaws or defects, and to all appearance they were as dense and homogeneous as a bar of hammered cast steel. In a lathe the turnings from castings thus treated curl up like wrought iron, and when finished with a file they present more the appearance of steel than of any cast iron we have ever before seen. The superintendent and foreman founder of Currier's works express the opinion that iron treated with the compound as described is made both harder and tougher, and generally improved in quality. They are employing this method in making all their fine castings, and express themselves well satisfied with the results thus far obtained.

The East Saginaw Water Works.—In our issue of March 18th we published a report of the recent test of the Holly Water Works at East Saginaw, Mich. Mr. B. B. Buckhout, who furnished us the figures, writes us that two errors have crept into the table. In the fourth test the height to which the water was thrown was 160 feet. This stream was from a hydrant three miles from the works, located on a 6 inch main. In the seventh test the streams were thrown to a height of 120 feet. This was from a 4 inch main, the hydrant also three miles from the works.

Owing to the prolonged winter and intense cold, the coal supply at Poughkeepsie is exhausted, and there is a panic in the coal market. Dealers have been unable to procure coal at Newburgh because of the flood disaster, which has carried away bridges, putting a stop to the running of coal trains, to tide water



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HENSHAW'S SNAPS
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The Bessemer Steamer.

Lord Henry Lennox writes to the London Times, March 4: The interest felt by the public in the channel steamer Bessemer is so great that you will probably be willing to receive an account of her first sea passage, which she has just completed. I therefore send you the impressions formed upon my mind by what I saw as a passenger on board of her from Hull to Gravesend.

For reasons connected with the future service of the ship between Dover and Calais it was decided that, although a few of the minor works upon her were yet incomplete, she should leave the Humber yesterday for the Thames, and having from the commencement taken great interest in her, I availed myself of the opportunity which was kindly afforded me of joining her at Hull yesterday afternoon. On doing so I found that owing to the rain and snow which had lately prevailed in Hull, the vessel was scarcely as complete as I should have expected to find her on the eve of such a passage, especially as it was well known that a strong wind was blowing and a considerable sea had been for several days running outside the river. Nevertheless, the ship left the dock between 3 and 4 o'clock, was swung for the adjustment of her compasses immediately afterward, and at 5 o'clock we started down the Humber, having on board much more coal than will form the usual supply of the vessel when on her daily service, but nevertheless not sufficient to justify its rapid expenditure upon the production of full speed in the engines, especially as there were certain experiments to be made upon the passage, and a very rough sea had to be encountered. It was past 7 o'clock in the evening when we passed the Spurn Light at the mouth of the Humber, and found ourselves in the presence of a strong wind from east-north-east, a heavy cross-sea, and with every prospect of a "wild" night. I may say at once that whatever other qualities the Bessemer may possess, she certainly proved herself then and throughout the night most remarkable for the almost total absence of pitching, and for the ease and moderation of her rolling. No doubt, as regard the pitching, something is due to her great length—some 350 feet—but this I cannot suppose is sufficient alone to account for the extraordinary steadiness which the Bessemer exhibits in this respect. It was

a striking sight to witness the behavior of the low ends of the ship in the heavy seas which we encountered, both bow and stern very frequently disappearing entirely for a moment beneath the waves that rolled over them. Nor was the rolling of the ship much less remarkable than her pitching, for it in no case amounted to what would be called heavy or violent rolling, notwithstanding the state of the sea. It was obvious to any one accustomed to the rolling of ships that some powerful cause was at work tending to diminish both the frequency and the violence of the vessel's oscillations, and I presume that cause is to be found in the unusually deep bilge keels with which she has been provided, and which particularly struck my attention on the morning before the launch last autumn. But whatever the cause may be, the Bessemer seems to me to possess extraordinary steadiness in a seaway, and to be free in a remarkable degree from everything like extreme pitching or rolling.

The limited supply of coal on board, as I have already stated, prevented her from being driven at a high speed during the night; and this was not desirable, because some of the work at the low free-board ends connected with the capstans was incomplete, and the engines required to be further worked before the tendency to hot bearings which they had previously exhibited could be subdued. It may be interesting to state, however, that when the end of the journey was approaching, off Harwich, and it was found that coal sufficient for a somewhat increased speed remained, the fires were pressed, and the ship easily passed the land for several hours in succession at between fourteen and sixteen knots an hour.

Your readers will be desirous of learning what experience we had with the suspended Bessemer saloon, and with the hydraulic machinery for working it. Part of this machinery was still in some minor respects incomplete; but in the course of this morning the lashings of this large and heavy structure were cast off, and it was taken charge of by the Bessemer apparatus, which worked it for the space of an hour or two, with a heavy beam sea still running. It was very satisfactory to find that this apparatus appeared to have full command over the saloon, and was capable of oscillating it easily in either direction at the will of the manipulator. The manipulation was effected by a

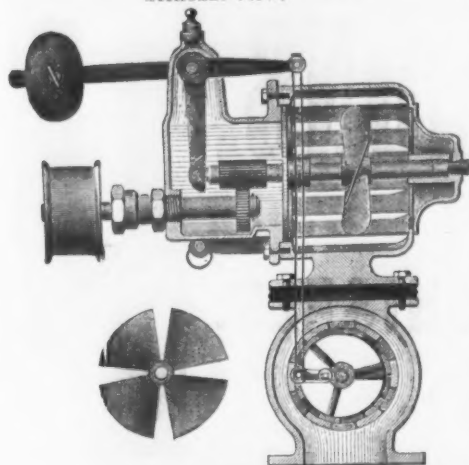
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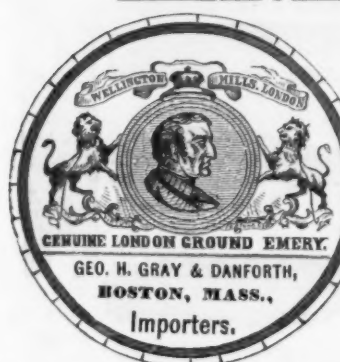
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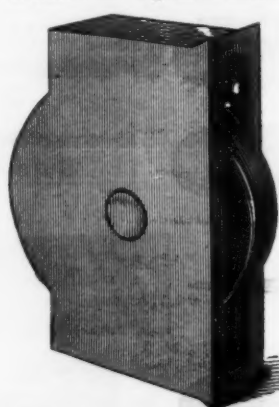
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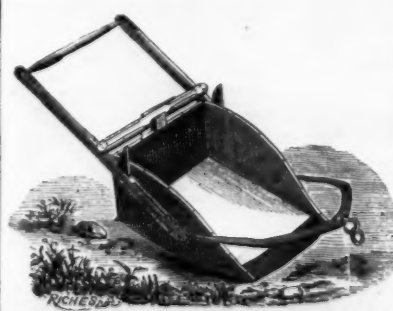
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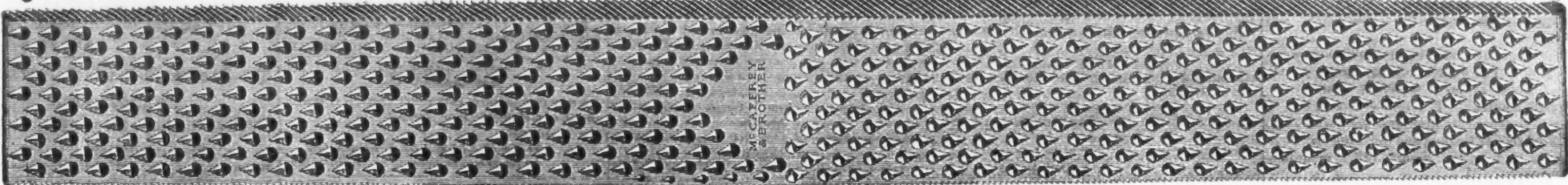


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Double Horse Rasp



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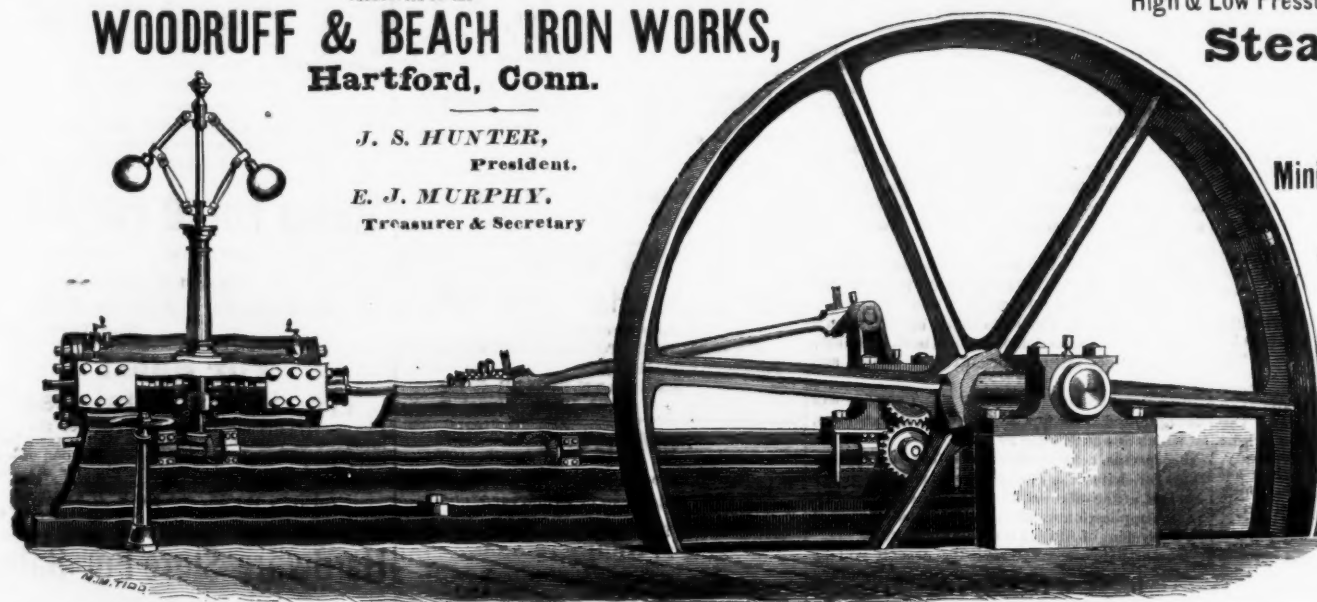
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High & Low Pressure Marine & Stationary
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AND
Boilers,
Mining, Powder and Paper Mill
Machinery,

And every Variety of Iron and Com-
position Castings made
to order.



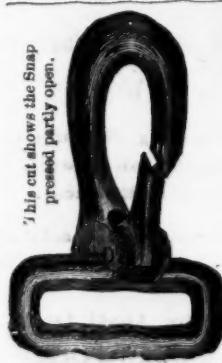
The following are a portion of the
Engines manufactured at these works,
and are a sufficient guarantee of our
capacity for doing first-class work,
viz.: The Pumping Engines in the
cities of Brooklyn, N. Y.; St. Louis,
Mo. and Hartford, Conn., and in the
Charlestown, Mass. and Norfolk, Va.
Navy Yards, and the engines in the
U. S. Steam Sloop of War Michigan,
Kearsage, Munton, Minnetonka and
Piscataqua, and the Gun Boat Cayuga,
Pequot and Nipsic, the Govern-
ment Transports Dudley Buck and
Geo. C. Collins, and the Steamships
America and United States. Also the
large Horizontal Engine for the new
Plate Mill of the Bay State Iron Co.

man holding a short lever in each hand, and moving them as nearly as he could in accordance with the oscillations of the ship, and it can scarcely be doubted by those who saw the operation that with a little practice the desired object will be fully accomplished. It was the opinion of Mr. Reed, however, and of Mr. Bessemer's representative, who was likewise on board, that these levers were not arranged in the best manner possible for the purpose, and that a slight modification in them may be made with advantage, with the view, not of increasing the power of the apparatus (which seems to be quite ample), but with the object of enabling the manipulator to work the governing valves of the machinery in more immediate accordance with the movements of the ship. I must say, however, that although the handling of the machinery was from this cause somewhat imperfect, it was evident that this was more due to the inexperience of the man who had to work the levers for the first time in the ship at sea than to any defect of the machinery itself. It was the opinion of the officers present that had the rolling of the ship been heavier, the comparative steadiness of the saloon would have been more easily secured. As regards the Bessemer saloon, therefore, it appeared to me that the success, if not quite all that could be desired, was more than could have been fairly expected at the very first sea trial made of it. Certainly a seat in the handsome saloon worked by this machinery was even today almost entirely free from the objectionable features of a Channel passage in one of the smaller vessels. The saloon itself is very strongly and handsomely built, and its furniture and decorations in carved oak are in good taste.

Superior Castings.—We saw at the works of Mr. Cyrus Currier, at Newark, on Thursday last, two specimens of cast iron work which eclipsed anything of the kind we had previously seen. They were made from No. 1 Leeseport iron, treated with cherry-heat welding compound. The compound was put in the ladle, in the proportion of five ounces to the hundredweight of metal, and the iron was run in upon it. After the ebullition had ceased the metal was skimmed, and poured in the usual manner. A careful examination of the planed surfaces of these castings failed to reveal any flaws or defects, and to all appearance they were as dense and homogeneous as a bar of hammered cast steel. In a lathe the turnings from castings thus treated curl up like wrought iron, and when finished with a file they present more the appearance of steel than of any cast iron we have ever before seen. The superintendent and foreman founder of Currier's works express the opinion that iron treated with the compound as described is made both harder and tougher, and generally improved in quality. They are employing this method in making all their fine castings, and express themselves well satisfied with the results thus far obtained.

The East Saginaw Water Works.—In our issue of March 18th we published a report of the recent test of the Holly Water Works at East Saginaw, Mich. Mr. B. B. Buckhout, who furnished us the figures, writes us that two errors have crept into the table. In the fourth test the height to which the water was thrown was 160 feet. This stream was from a hydrant three miles from the works, located on a 6 inch main. In the seventh test the streams were thrown to a height of 120 feet. This was from a 4 inch main, the hydrant also three miles from the works.

Owing to the prolonged winter and intense cold, the coal supply at Poughkeepsie is exhausted, and there is a panic in the coal market. Dealers have been unable to procure coal at Newburgh because of the flood disaster, which has carried away bridges, putting a stop to the running of coal trains, to tide-water.



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MIDDLETOWN, CONN.

The Celebrated "Baldwin" Plane Iron.
HENSHAW'S SNAPS

Greatly Improved in Style and Pattern.
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UNIONVILLE MINE, Chester County, Pa.,
Manufactured by the
PENNSYLVANIA CORUNDUM COMPANY.

Are now prepared to furnish a very superior quality of Genuine Corundum, from the Unionville Mine, Chester County, Pa., which is the largest known deposit of Corundum in the world. It is harder than Emery or any other known Mineral except the "Diamond," and superior in its cutting qualities for the polishing or cutting of steel, iron or other hard substances for which Emery has been used.

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LOCKS AND LATCHES.

Fairbanks' Standard Platform and Counter Scales, Paint and Coffee Mills Builders' and Domestic Hardware generally.

New York Office, 96 Chambers St., N. Y.

UPPMAN & EMORY, Baltimore, Md., Southern Agents.

The Bessemer Steamer.

Lord Henry Lennox writes to the London Times, March 4: The interest felt by the public in the channel steamer Bessemer is so great that you will probably be willing to receive an account of her first sea passage, which she has just completed. I therefore send you the impressions formed upon my mind by what I saw as a passenger on board of her from Hull to Gravesend.

For reasons connected with the future service of the ship between Dover and Calais it was decided that, although a few of the minor works upon her were yet incomplete, she should leave the Humber yesterday for the Thames, and having from the commencement taken great interest in her, I availed myself of the opportunity which was kindly afforded me of joining her at Hull yesterday afternoon. On doing so I found that owing to the rain and snow which had lately prevailed in Hull, the vessel was scarcely as complete as I should have expected to find her on the eve of such a passage, especially as it was well known that a strong wind was blowing and a considerable sea had been for several days running outside the river. Nevertheless, the ship left the dock between 3 and 4 o'clock, was swung for the adjustment of her compasses immediately afterward, and at 5 o'clock we started down the Humber, having on board much more coal than will form the usual supply of the vessel when on her daily service, but nevertheless not sufficient to justify its rapid expenditure upon the production of full speed in the engines, especially as there were certain experiments to be made upon the passage, and a very rough sea had to be encountered. It was past 7 o'clock in the evening when we passed the Spurn Light at the mouth of the Humber, and found ourselves in the presence of a strong wind from east-north-east, a heavy cross-sea, and with every prospect of a "wild" night. I may say at once that whatever other qualities the Bessemer may possess, she certainly proved herself then and throughout the night most remarkable for the almost total absence of pitching, and for the ease and moderation of her rolling. No doubt, as regard the pitching, something is due to her great length—some 336 feet—but this I cannot suppose is sufficient alone to account for the extraordinary steadiness which the Bessemer exhibits in this respect. It was

a striking sight to witness the behavior of the low ends of the ship in the heavy seas which we encountered, both bow and stern very frequently disappearing entirely for a moment beneath the waves that rolled over them. Nor was the rolling of the ship much less remarkable than her pitching, for it in no case amounted to what would be called heavy or violent rolling, notwithstanding the state of the sea. It was obvious to any one accustomed to the rolling of ships that some powerful cause was at work tending to diminish both the frequency and the violence of the vessel's oscillations, and I presume that cause is to be found in the unusually deep bilge keels with which she has been provided, and which particularly struck my attention on the morning before the launch last autumn. But whatever the cause may be, the Bessemer seems to me to possess extraordinary steadiness in a seaway, and to be free in a remarkable degree from everything like extreme pitching or rolling.

The limited supply of coal on board, as I have already stated, prevented her from being driven at a high speed during the night; and this was not desirable, because some of the work at the low free-board ends connected with the capstans was incomplete, and the engines required to be further worked before the tendency to hot bearings which they had previously exhibited could be subdued. It may be interesting to state, however, that when the end of the journey was approaching, off Harwich, and it was found that coal sufficient for a somewhat increased speed remained, the fires were pressed, and the ship easily passed the land for several hours in succession at between fourteen and sixteen knots an hour.

Your readers will be desirous of learning what experience we had with the suspended Bessemer saloon, and with the hydraulic machinery for working it. Part of this machinery was still in some minor respects incomplete; but in the course of this morning the lashings of this large and heavy structure were cast off, and it was taken charge of by the Bessemer apparatus, which worked it for the space of an hour or two, with a heavy beam sea still running. It was very satisfactory to find that this apparatus appeared to have full command over the saloon, and was capable of oscillating it easily in either direction at the will of the manipulator. The manipulation was effected by a

Two Young Western Cities.

The City of Fond du Lac, Wisconsin, is in the heart of the famous "pinerias" of that flourishing State, yet the inhabitants do not depend solely upon the lumber trade which has gained for the town quite a reputation, and is now a leading feature among the enterprises that occupy the attention of the people. The lumbermen years ago foresaw that diversity of manufactures would alone insure permanent prosperity, and many of them made investments in other branches of industry. The result is a grand one, their institutions now covering almost the whole category of manufactures. Among the prominent establishments are the following: The extensive sash, door and blind factory of C. J. L. Meyer, making 10,000 sets of sashes, 6000 doors and 2000 pairs of blinds weekly, employing 700 men in Fond du Lac and 300 in Chicago, and doing a business of over \$1,000,000 yearly; the Mills Manufacturing Company, making 1800 doors, 900 pairs of blinds, and 3000 lights of sash per week, and employing 160 men; the Fond du Lac Threshing Machine Company, which makes the Improved Eclipse and the Pride of the West; the La Belle Wagon Works, owned by B. F. Moore, employing 160 men; the Union Iron Works, W. H. Hiner & Co., proprietors, employing 100 men and constructing all kinds of machinery, and the Fond du Lac Manufacturing Company, operating the Fountain City Paper Mill, one of the most complete mills in the country. C. J. L. Meyer is building a charcoal blast furnace which, when completed, will materially aid in the development of this promising city of the Northwest.

Winona, Minnesota, is a great shipping point for grain. The figures roll up grandly. Of wheat alone at least 4,000,000 bushels are shipped annually. The lumber trade, too, is immense. There are three saw mills which cut 3,000,000 feet of lumber, and great quantities of shingles and laths. Among other manufactures are six sash factories, four flouring mills in the city limits and others near by, two foundries and two more under contract, a tanning mill shop, two or three factories for agricultural implements, one large carriage factory and several small ones, and a paper barrel manufactory. It is these several branches of the mechanical and other industries which have brought hundreds of hard-working men here with their families and augmented the wealth and population of Winona. Another cause of growth is the location here of the round house, machine shops and car factory of the Winona and St. Peter Railroad. In these several departments are 218 men at this time, and not uncommonly 300, all having their homes in this city.

Ironmaking in Pennsylvania in 1759.

A recent publication of the Historical Society of Pennsylvania (in conjunction with that of Delaware), is "A History of New Sweden, the Settlements on the River Delaware," by Israel Acrelius, translated from the Swedish, with an introduction and notes, by William M. Reynolds, D. D.

Few persons bear in mind that when William Penn and his colonists came to this country, the Swedes, who had been here for nearly half century, received their new fellow citizens with great friendliness, carried up their goods and furniture from their ships, and entertained them in their houses without charge. Penn himself made grateful acknowledgment of the friendly reception of the Swedes, and gave them a place both in the General Assembly and the Governor's Council.

Acrelius, in his account of the condition of the Province at the time of his residence, in 1759, describes the property qualification prescribed as necessary for the right to vote, "fifty acres of land located, and twelve of those under cultivation, or property to the value of fifty pounds of provincial currency," and the method of voting by ballot, a matter of very doubtful antiquity in our early colonial history. As a native of Sweden, and interested in its iron production, Acrelius gives an account of the iron works in Pennsylvania and the adjacent English colonies in his time, which furnishes one good basis for comparison between the condition of the country then and now. At that time there were eight iron works in this colony, of which the "Cornwall Works" are still in active and successful operation. Then it made twenty-four tons of iron a week, and kept six forges regularly at work. The pig iron was mostly sent to England, the bar iron was used in Philadelphia and the interior towns. Competent authority reported that pig iron was sold at the furnaces for \$3. 6/8 per ton, bar iron at the forge for \$20 per ton, on six months' credit; while the calculation of expense put the pig iron as costing at the furnace \$2 per ton, and bar iron at the forge \$10 per ton; molding goods or castings of kettles, stoves, etc., sold at the furnace for \$3. 6/8 per ton, and as, even then, Pennsylvania, New Jersey and Maryland supplied more iron than their inhabitants needed, it was exported to London, which had an exclusive privilege of trade, to the West India Islands, and to other English colonies.

Japanese Paper.

At the great Vienna Exhibition a complete collection of articles of wonderful variety, and all made of paper, attracted much attention in the Japanese section. The process of manufacture was a secret at the time, and the public were at a loss to comprehend how pocket-handkerchiefs, napkins, dresses, ornaments, umbrellas, etc., could be made so strong and durable from so frail a material. A member of the society of Orientalists, M. Zappe, has at length penetrated the mystery, and published

the process by which this paper is obtained. The substance employed is the bark of *Broussonetia papyrifera*, a sort of mulberry-tree, which is also used by the inhabitants of the islands of the Pacific for a sort of cloth, the manufacture of which, however, differs completely from that employed by the Japanese for their paper. The rearing of this tree is extremely easy; its roots are cut up into pieces three inches in length, which are stuck into the ground, where they strike with astonishing rapidity. Within the first year their offshoots attain the length of nine inches, and thence that within the second. The stem also grows fast and reaches the height of thirteen feet in the course of three years; and if care has been taken to prune it properly, the plant has the appearance of a vigorous shrub. At the beginning of winter the branches are lopped off and cut into bits two inches long, then boiled until the bark strips off easily. The latter is then laid out to dry in the air for two or three days, and afterward exposed for twenty-four hours to the action of a running stream, and ultimately carded, whereby two kinds of fibres are separated from each other, viz: the outer ones, called *sarabawa*, which are coarse and serve to make paper of inferior quality, and the inner ones, called *osori*, for first-rate sorts. These latter are rolled up into bales weighing thirty-five pounds each, which are again exposed to running water, then dried, and, lastly, boiled in large kettles. After rinsing again in cold water, these fibres are now crushed and pounded in wooden mortars for about twenty minutes, made up into balls and reduced to pulp, mixing therewith a small quantity of a liquid extract from *hebiocus manhot*, and some rice water to preserve it from the ravages of insects. That pulp is then made into paper in the usual way, or drawn into threads to be woven with silk.

Co-operative Iron Manufacture in St. Louis.

The Co-operative Rail Mill, at East St. Louis, promises to be a success. A writer who has lately visited the works says:

The company has nearly ten acres of ground, in the center of which stands their immense building, all of which are surrounded and hemmed in by the four great railways—the Vandalia line, the I. & St. L., the O. & M., and the Southeastern, thereby giving it superior advantages for shipments to all parts of the country. About 100 yards south of this establishment stands the new union passenger depot, which is near completion, and when opened will contribute greatly to the convenience and comfort not of the citizens of East St. Louis, but all persons traveling upon these different roads.

This mill has been in operation for quite a while, with occasional "stand stills," but some eight months ago the present co-operative company took hold of it "iron-clad," and at no time during its history have its prospects and business interests been so flattering as this spring, under its new board of officers.

The company are now working 125 men, and running full capacity, making a T rail from 24 to 30 feet in length, the quality of which is not surpassed by any rail mill in the country.

So great is the capacity of this manufactory that 400 tons of iron are worked into rails each week, and from present indications and the shipments that are daily being made, a bright and prosperous future awaits this company, which is so ably and successfully represented by Mr. Vital Jarrot, president; East St. Louis Bank, treasurer; Anthony Wolfer, secretary; and T. H. Stevens, superintendent. All orders attended to promptly.

Special Notices.

The undersigned, having had 10 years' experience in the jobbing Hardware business of New England, desires to travel either on salary or commission for some manufacturer or house of New York City.

C. S. H.
Sudbury Street, Boston Mass.

TO MANUFACTURERS
OF Am. Pocket & Table Cutlery, Files,
Saws, Curry Combs, &c., &c.

A New York Hardware and Importing House, canvassing the principal cities of the Western and Southern States, is desirous of securing the sole agency to represent a manufacturer of American Pocket and Table Cutlery, Files, Saws, Curry Combs, &c., &c. Address A. B., Box 2738, New York, P. O.

\$35,000

Will Purchase the Controlling Interest in an Established Manufacturing Company, situated in New England. A splendid chance for a business man or for investment.

Address, in first instance, CONTROL,
Office of The Iron Age, 10 Warren St., N. Y.

MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/; every additional line, 10d. Price, 6d. per Copy, or 30/ per annum, inclusive of postage to the United States.

A. PURVES & SON,

Corner South & Penn Streets, Phila., Dealers in
Scrap Iron & Metals, Machinery, Tools,
Shafting & Pulleys, Steam Engines,
Pumps & Boilers, Copper, Brass,
Tin, Babbit Metals, Foundry
Facings. Best Quality Ingot Brass.
Cash paid for all kinds of Metals and Tools.

Wanted.

A situation as bookkeeper or cashier of an iron works, a hardware business, or in the coal trade, which the advertiser understands in all its branches. Highest references of character, capacity, &c.

H. D.,
Office of The Iron Age, 10 Warren St., N. Y.

SPECIAL NOTICE.

I have three patents for Dies, Machinery, and Tools for making Angers and Bits, each running seventeen years; dated as follows: Dec. 19, 1865; January 31, 1866; and July 3, 1866. There is a special claim on each of the Dies. All persons infringing on said patents will be held responsible to the extent of the law. Russell Jennings, DEER RIVER, CONN., Sept. 7, 1874.

Special Notices.

THE CHATTANOOGA
Foundry and Machine
WORKS,
Mining & Manufacturing Co.

(Late WEBSTER & MARKS and THOS. WEBSTER,
Chattanooga, Tenn.)

Incorporated under a charter granted by the State of Tennessee: Capital, \$500,000, in 5000 shares of \$100 each, with power to increase to \$1,000,000. Subscribed Capital \$150,000 in 1500 shares of \$100 each, fully paid up.

This Company is formed for the purpose of acquiring and extending the established business and works of Webster & Marks, well known as Thomas Webster's Foundry and Machine Works, situated at Chattanooga, Tennessee, established in 1857, for building every description of Foundry, Mechanical and Engineering requirements, and for the purpose of purchasing or leasing mineral lands and erecting works thereon.

The Works are substantially erected on about five acres of land, all of which is freehold, and are situated in a most eligible position for making all kinds of Castings and Machinery, in the center of the Coal, Iron and Mining districts of Tennessee, Georgia and Alabama, and surrounded by at least twenty Pig Iron Furnaces in those States. They are located above high water in the center of the city, and connected by a side track with all the lines of Railroad centering in Chattanooga.

These Works have been most successfully carried on by Mr. Thomas Webster, are in full operation, and comprise a large and well equipped Foundry, connected with the Machine Shops by a narrow-gauge track, and contain one of Scott's English Patent Gear Wheel Molding Machines. The Machine Shop, the largest in the entire South, is fully equipped with the best and most modern improved machinery, consisting of Lathes, Planers, Boring Mill, Drill Presses, &c. The Pattern Shop is fitted up with all the necessary Tools and Machinery for making Patterns. The large Blacksmith and Boiler Shops are fully equipped.

The stock on hand is of recent purchase, and all in good working condition. There is also a large and valuable amount of patterns for furnace and mining machinery, peculiarly adapted to this country, and for the building of Narrow-Gauge Locomotives. The Works are well supplied with orders, and the opening and development of new Iron Ore deposits and other mineral properties in the neighboring country, with a rapidly increasing population, combine to increase the demand for machinery of all descriptions.

The Works will be transferred to the new Company in full working condition, with all beneficial contracts, and will include the whole of the land and buildings thereon, together with the modern and valuable Plant, Machinery, Fittings, Sliding and good will.

The contract price of the Works to the Company will be \$120,000; \$50,000 in cash and \$70,000 in 700 ordinary shares of \$100 each, fully paid up.

The estimate on which this sum is based is from a carefully made valuation of freehold land, buildings, machinery, plant, patterns, fixtures, sliding and good will.

The Directors and Officers of this Company will be appointed at the first meeting of the stockholders, of which due notice will be given.

Prospectus, copy of charter and forms of applications for shares may be procured from the Secretary *pro tem*, at the offices of the Company at the Works. Each application for shares must be accompanied by a payment of \$10 per share on application. Should no allotment be made the deposit will be returned without deduction.

[Here follows the charter, which is very full in its grant of manufacturing and mining franchises].

Opinion of Counsel upon Validity of
Charter.

[Copy]. CHATTANOOGA, TENN., Jan. 19, 1875.

THOMAS WEBSTER—SIR: We have examined the accompanying copy of charter of "The Chattanooga Foundry and Machine Works, Mining and Manufacturing Company," with a view to ascertain its validity, &c., and have come to the conclusion that the charter was regularly obtained and is legal. Under it the company or corporation may safely organize and invest their money or other capital. All the powers enumerated in said charter are consistent with the Constitution of the United States and of the State of Tennessee; and they would be enforced in the courts of the country in law and in equity.

Respectfully, [Signed],
TREWITT, GASKILL & TREWITT, Attys.

Prospectus and forms of application for Shares can also be procured from

GRIGGS & CARLETON,
Financial and Business Brokers,
98 Broadway, New York.

The managing partner of a Retail Hardware House doing a business of one hundred thousand yearly, is about to retire from the firm, and would accept a situation as traveling salesman for a first-class manufacturing or jobbing establishment, with route west of Chicago.

References first-class. Ready April 1st.

Address "CALIFORNIA,"

Office of The Iron Age,
No. 10 Warren Street, N. Y.

HARDWARE & CUTLERY at Auction,
By BISSELL, WELLES & MILLETT,
Large Special Trade Sale.

Hardware, Cutlery, Guns, French
Tinned Ware,
At No. 15 Murray St., on Tuesday and Wednesday,
March 30 and 31. This sale will embrace about 200 lots of desirable goods. It will be to the interest of the trade who buy for cash to be present.

MERCANTILE AGENCY.

For the sale of Hardware or any Mercantile Business. Parties desirous of going into business cannot do better than to address this agency. Also clerks, shipwrecked, best of reference required. Parties wishing clerks or assistants, please address this agency. Hardware stores for sale and wanted. Stamp inclosed insures answer.
Address, JOHN I. HARRIS,
Box 1633, Binghamton, N. Y.

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THE
McHaffie Direct Steel Castings Co.

STEEL CASTINGS,
Solid and Homogeneous, guaranteed to stand a Tensile strain of 25 tons per square inch. An invaluable substitute for expensive WROUGHT IRON FORGINGS or for Iron Castings, where great strength is required. Office, cor. Ewell and Leavitt Sts., PHILADELPHIA.
Send for Circular and Price List.

Charcoal Blast Furnaces.

Having during the past 10 years constructed and put in operation a number of the most successful Charcoal Blast Furnaces in the country, and having a competent corps of workmen constantly in my employ, I am enabled to offer advantages in constructing or remodeling upon the latest and most approved plans.
Examinations of Furnace Property made and reported upon when solicited. Correspondence promptly attended to.

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92 W. Alexander St., Rochester, N. Y.

A PARTNER WANTED

by the 1st of January, 1875, in an established Hardware business, who can put in from \$30,000 to \$25,000, either cash, or stock suitable for jobbing trade.

For particulars, address, B.,
Office of The Iron Age, 10 Warren St., N. Y.

DISCOUNT LISTS.
Screws, 20 to 60¢; Bolts, 25 to 80¢; Files and Rasps, 25¢ to 85¢ to the lb. Complete for \$1.00.
DAYTON & LAMBERSON, 83 & 85 Duane St., N. Y.

Wanted.

A superintendent of experience capable of taking charge of a Malleable Iron Works.

Address
ST. LOUIS MALLEABLE IRON CO.,
2116 Market Street, St. Louis, Mo.

DROP FORGINGS.

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings
in quantities to order at reasonable rates.

HERMANN BOKER & CO., Proprietors,
101 & 103 Duane St., N. Y.

Merchant Iron or Nails

Wanted in exchange for 300 tons No. 1 Wrought Scrap Iron.

GILCHRIST & GRIFFITH,
Mount Pleasant, Iowa.

TO LET,
The Light, Handsome Office

Now Occupied by
MESSRS. HEATON & DENCKLA.

Possession immediately.
HERMANN BOKER & CO.,
101 Duane Street, N. Y.

Wanted,

to purchase a three high 19 inch Merchant Train, with engine. Either new or second hand.

Address, with particulars,
A. & P. ROBERTS & CO.,
265 South 4th Street, Phila.

Engineering engagement desired by an engineer accustomed to the computation of strains in structures, and to the use of all varieties of engineering instruments, of experience in testing the strength of materials, and recently Assistant Inspector for the Illinois and St. Louis Bridge Co. Would take charge of a draughting room, or of construction. Bridging preferred. Address C. S. D.,
Drauser 9, Wolcott, N. Y.

STERLING
IRON & RAILWAY CO.,
STERLING
ANTHRACITE PIG IRON
FOR FORGE AND FOUNDRY USE.
MAGNETIC IRON ORE
FOR BLAST AND PUDDLING FURNACES.
A. W. HUMPHREYS, Treas.,
42, PINE ST., N. Y.

For Sale, &c.

For Sale,
A Blake's Ore and Stone
Crusher and Breaker.
Usual size for furnaces; but little used and in excellent condition. Price very low.
M. M. PILLBURY, 55 John St., N. Y.

FOR SALE.

At Lowest Manufacturers' Rates,
GUNS & SHEET ZINC,
Best German and Belgian Brands,
By LOUIS WINDMULLER & ROELKER,
20 Reade Street, N. Y.

For Sale, &c.

MACHINERY FOR SALE.

The following machinery, &c., being that recently owned by the

American Rolled Nut & Tube Co.,
at very low prices. Consisting of several sets of
ROLLS, HOUSINGS, BED PLATES, &c.,
for Rolling Nuts, including machines for finishing,
1 train of

8 in. Guide Rolls.
Large quantity of

Rolled Nuts for Bolts,
from 1 1/4 to 2 in diameter, reamed and burred ready
for use. Lot of

STANDING PLATES.

These nuts have been extensively used, and are regarded as equal to any made, and will be sold much under the market value. Will also sell a

Fourth Interest in the Patent for making these Nuts.

It is confidently believed that nuts can be made on this plan cheaper and better than on any other yet adopted, and may be rolled of any length or size that may be required. All of the above machinery is nearly new and in complete order. For further information, apply in person or by mail to

N. C. NEWTON,
Metropolitan Iron Works, Richmond, Va.

FOR SALE.

An 1/2 inch mill train for making Merchant, Band and op Iron. Will be sold cheap.

Apply to
W. W. JONES,
Near the Lehigh Valley Railroad Depot,
Allentown, Pa.

To Stove Manufacturers and
Foundrymen.

The Carbon Stove Company,
Of Burlington, N. J.,

Will sell their Foundry, with all its appurtenances, business and good will, upon very liberal and accommodating terms, offering to any party wishing to engage in the Stove or general Foundry Business a rare opportunity.

The Foundry Buildings, which are of a capacity to employ forty or more molders, are very conveniently located upon navigable tide water on one side, and the Pennsylvania Railroad, with its freight station in front, being on the direct line between New York and Philadelphia.

The Buildings, Machinery and Appliances are all in prime order, and the assortment of Patterns, &c., for Stove, Range or Heater work, unsurpassed.

Address, for terms or other particulars,
CARBON STOVE CO., Burlington, N. J.

Steam Forge For Sale.

The whole or a half interest. Address

"STEAM FORGE,"
Room 31, No. 5 Beekman Street,
New York City.

For Sale!
Hardware Business

In a growing manufacturing town, one of the best locations in Vermont. Business well established and profitable. Stock about \$10,000 in good order. This affords an excellent opportunity for a party with small capital to secure a paying business. Address, W. R. BIXBY & SON,
Vergennes, Vt.

Hardware Store For Sale.

Will sell on good terms (no bonus)

One of the best appointed Hardware
Stores in the West,

Located in a Growing Manufacturing
Town of 12,000 Inhabitants,
Doing the Leading Business.

Present Stock about \$11,800, all fresh and nicely
sampled in boxes. With a small additional capital
a business of \$50,000 a year can be done

Must be sold by April 10th.

Address
HARDWARE,
Box 1929, Eau Claire, Wis.

For Sale,
Stove and Tin Business.

Will sell, on good terms, one of the best arranged
House Furnishing Stores in Canada West, at St.
Thomas. The premises are roomy, the buildings
having been arranged especially for this trade, with
Tinmith's workshops and benches complete for
12 men.

Present Stock about \$6000.

St. Thomas is the head quarters of the Canadian
Southern Railway Co. It is a practical, energetic
man this offers unusual advantages. Business well
established and with good connection. Reason for
disposal, present proprietors increasing their whole-
sale and retail Hardware Store next door to the
above premises. Address

HORSMAN & HORSMAN,
Iron and Hardware Merchants,
St. Thomas, Canada West.

FOR SALE,

at 10c. a copy, general Spanish
Weekly Market Review, written
and published by the subscriber,
1 April, 1875, number 158, circu-
lating in Mexico, the West Indies,
Central and South America, including Brazil, Spain
and Manila, on which certain standard articles of
American manufacture are quoted. The undersigned
is also a

Translator for Manufacturers and
Land Companies,

from and into the
ENGLISH,
SPANISH,
FRENCH,
and GERMAN.

Spanish Catalogues got up correctly and with des-
patch. Address,
C. KIRCHHOFF,
Metal Reporter of "The Iron Age,"
Box 2806, N. Y.

IRON.

American Pig.—In American Pig there is little change in the situation, except that there seems now more prospect of the settlement of the labor troubles in the coal districts. The Delaware, Lackawanna & Western men have decided to keep on working on the present basis, and the men who are now on strike will go to work. The Delaware & Hudson Canal Co.'s men decided to go back to work on the present basis until May 1st, when they will demand an advance of 10 per cent., and strike if it is refused. There is but little No. 1 Foundry Iron offering, on account of the small proportion now made. There is but little demand, and if any considerable quantity should be put on the market, there would be no ready buyers. We quote Foundry No. 1, \$28; Foundry No. 2, \$26; Gray Forge, \$24 @ \$26.

Scotch Pig.—We note the sale of 300 tons Coltness, 300 tons Glenarnock, and 300 tons Eglinton, all from ship, on private terms. It looks as though those parties on the other side who sent out Iron here on speculation must have lost by the venture, as they have been usually compelled to accept low prices at the dock, rather than have it put in store. We quote Coltness \$37, and Eglinton, \$34 @ \$35.

Rails.—The market continues as before quoted, without any special transactions in this section, though we hear of some in the interior on terms we did not learn. We quote American \$48 @ \$53, at works.

Old Rails.—There is nothing to report, and we continue our nominal quotation of \$30 @ \$31.

Scrap.—There have been some sales during the week on private terms, and the stock here is smaller and more strongly held than before. We quote \$35 @ \$37.

METALS.

Copper.—The more genial weather has caused some revival in the demand for Copper, and between 300,000 and 400,000 pounds Lake have changed hands, in part on the spot at 21½¢, and partly April delivery, at between 21½¢ and 21¾¢. Inquiry is evidently on the increase, and there is an improved tone in the market, which may speedily lead to more extensive dealings, both on the spot and to arrive. The available supply is quite reduced, hence the firmness displayed by holders. Baltimore may be quoted 21½¢ @ 21¾¢, as to quantity. No later official cable reports have come to hand from England, nor are we in possession of mail accounts later than those given in our last review. General business here would have been more active but for the extreme gold fluctuations, which, with a drop of nearly 2 per cent. in the premium in a single day, interfere a good deal with legitimate transactions, especially in articles quoted in gold. The elements at hand are, on the whole, sound, both dealers and consumers carry moderate stocks, and the metal trade expects to do a good business; it is, therefore, to be hoped that this constant excitement in the gold market may soon subside, and leave our merchants and manufacturers undisturbed in their preparations for an active business campaign. Prospects in Europe are also fair; the decline suffered by metals on the other side has been greater and more precipitate than here since January 1st, while the out-look is equally as encouraging. The month of April will consequently be of special interest, inasmuch as it will serve as a sort of touchstone as to what we may expect this season, and the freer we can remain from the effects artificially produced by gamblers in financial spheres, the more untrammelled will be the healthy revival so much needed by trade and industry. The manufacturers of Copper have remained well supported, as follows: New Sheathing at 28¢; Bolt and Braziers, 30¢; Bronze and Yellow Metal Sheathing, 21¢; and Yellow Metal Bolts, 28¢, net cash.

Tin.—Cable news of the result of the Dutch Trading Company's sale held to-day, has not yet been received. On the other hand, the English, as well as the Singapore, market went on improving, Straits at London now having returned to \$20, and at Singapore to \$23.75. The real motives which caused operators for a rise in England and Holland to re-enter the market will remain unknown to us till we receive the mail accounts, but as the movement was started at London, it is to be supposed that there was an abatement in either the Straits or Australian shipments. Meanwhile, later Australian mail news has dropped in here, up to January 15, from which we perceive that Australia produced in 1874, 8404 tons of Tin Ore, or at 64 per cent. about 5370 tons of pure Tin. On referring to our editorial on the "World's supply of Tin," dated January 28, 1875, it will be found that we put down Australian production at 8500 tons, against 2900 in 1873, while the real yield in pure Tin has been 421 tons less. Four hundred tons may not appear much, but where so much stress has been laid on the rapid increase in Australia, we should guard against the opposite extreme of exaggerating its importance. More correct views may have obtained in England and Holland, and people interested in Tin may have arrived at the conclusion that the Australian increase had been allowed to depress Tin a great deal more than there was any reason for. But, however this may be, and admitting that the present rebound be a legitimate and probably lasting one, it should not be overlooked that a very material advance is not likely, now that the Europeans have the Isthmus of Suez and steamers to enable them to place promptly a fresh supply upon the markets, with the Malacca production fully restored. Business in Tin here has been quiet, the dealings being of a jobbing character merely. We quote on a tolerably firm market, in gold, as follows: Straits, 20½¢ @ 21¢; English Common, 20¢ @ 20½¢; English Refined, 20½¢ @ 20¾¢; and Banca 25¢. The stock of Tin here is not large, and the bulk of it is in firm hands. Tin Plates have, in a jobbing way, been tolerably active, while of larger dealings there have been none. We quote firm, Charcoal Bright, \$9.75 @ \$10, gold, per box; ditto Terne, \$9.25 @ \$9.50; Coke Tin, \$7.25 @ \$7.75; and ditto Terne, \$7.25 @ \$7.50, all gold.

Lead.—A sale is reported of 304 tons Oakland, California, at 5½¢, gold, which would seem a rather high figure, inasmuch as Western, deliverable here, was simultaneously offering at 6-70, currency, which, at the then prevailing gold quotation of 110 was equal to 5-77¢, gold, and yet remained without a purchaser. We quote Domestic 5½¢ @ 5¾¢, gold. Business in Lead as yet moves slowly, but the prospect ahead is fair. Foreign re-

mains inactive at nominally 6½¢ @ 6¾¢, gold. The accounts from Europe are still gloomy, the weakness now having spread to Germany also, which had borne up tolerably well thus far. The manufacturers of Lead are steady, as follows: Bar, 8½¢; Pipe, 9¢, and Sheet, 9½¢, less 10 per cent.

Spelter and Zinc.—The stock of foreign Spelter is reduced to 40 tons W. H., worth 7½¢, gold, and 75 tons Stolberg, worth 7¢, gold. Nothing has transpired in it. In Domestic we have had but a moderate jobbing trade; it is now held with a tolerable degree of firmness, and it is not easily obtainable below 6½¢, currency. We quote 6½¢ @ 6¾¢, gold, Sheet Zinc is dull at 9¢ @ 9½¢, gold, according to brand.

Antimony is moving off in moderate parcels at 12½¢, gold. There is no change at London, which remains \$24.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending March 29, 1875:

Hardware.	Iron.	Steel.	Metals.
Amson Louis, Cases, 3	Naylor & Co. Pig, lots, 1	Brown Wm. Bundles, 82	Byrne Joseph & Co. Tin plates, bxs., 110
Caske, 10	Phelps Dodge & Co. Sheet, bbls., 225	Caske, 36	Brace & Cook Tin plates, bxs., 700
Allison D. W. Barris, 1	Pig, tons, 700	Hoglan John. Mds. pkgs., 47	Hart Lucius & Co. Tin, ingots, 300
Baker Hermann & Co. Packages, 3	Bundles, 232	Hubbard, Lippincott & Bakewell. Bundles, 73	Hosier & Co. Scrap, copper, bbls., 354
Caske, 8	Spiegel, lots, 1	Manning H. O. & Co. Cases, 3	Lamarche H. Zinc, cks., 40
Arms, cks., 33	Spiegel, cks., 5	Caske, 3	Naylor & Co. Tin plates, bxs., 2004
Barstow F. W. & Sons. Chains, 3		Davis, Turner & Co. Cases, 2	Phelps Dodge & Co. Tin plates, bxs., 16-
Drexel, Morgan & Co. Cases, 2		Frasse P. A. & Co. Mds. pkgs., 7	Mds. bbls., 240
Davis, Turner & Co. Cases, 2		Field A. & Co. Mds. pkgs., 7	Spinnell D. Copper, cks., 1
Frasse P. A. & Co. Mds. pkgs., 7		Friedmann & Lanterjung. Mds. pkgs., 2	Stroude W. L. Terne plates, bxs., 150
Field A. & Co. Mds. pkgs., 7		Hildick & H. Nails, cks., 100	Van Nest A. R. & Co. Tin plates, bxs., 451
Lau & Garlicks. Mds. pkgs., 1		King, Briggs & Co. Files, cks., 1	Wheeler E. S. & Co. Tin plates, bxs., 374
Per caps, cs., 4		King, Briggs & Co. Files, cks., 1	Order.
Merchants Dispatch Co. Cases, 2		Lau & Garlicks. Mds. pkgs., 1	Tin plates, bxs., 7977
Mayer Robert & Co. Cases, 7		Merchants Dispatch Co. Cases, 2	Pig lead, 234
Moore J. P. Sons. Gun caps, cs., 6		Mayer Robert & Co. Cases, 7	Tinned sheets, cs., 18
Peters Bros. Mds. pkgs., 3		Moore J. P. Sons. Gun caps, cs., 6	
Robins C. & Sons. Cases, 3		Schoverling & Daly. Mds. pkgs., 2	
Schoverling & Daly. Mds. pkgs., 2		Strauss L. & Sons. Packages, 1	
Strauss L. & Sons. Packages, 1		Spies, Klesam & Co. Guns, cs., 3	
Spies, Klesam & Co. Guns, cs., 3		Van Wart & McCoy. Mds. pkgs., 12	
Van Wart & McCoy. Mds. pkgs., 12		Van Nest A. R. & Co. Packages, 7	
Wolfe S. N. & Co. Cases, 23		Wolfe S. N. & Co. Cases, 23	
Ward A. Packages, 1		Ward A. Packages, 1	
Wiebush & Hilger Mfg. Co. Cases, 23		Wiebush & Hilger Mfg. Co. Cases, 23	
Caske, 23		Caske, 23	
Packages, 9		Packages, 9	
Gun caps, cs., 4		Gun caps, cs., 4	
Cutlery, cs., 4		Cutlery, cs., 4	
Order.		Order.	
Caske, 12		Caske, 12	
Files, cks., 37		Files, cks., 37	
Brand J. Pig tons, 300		Brand J. Pig tons, 300	
Harrison W. G. Cast lots, 1		Harrison W. G. Cast lots, 1	
Hess & Co. Safe, 1		Hess & Co. Safe, 1	
Henderson Bros. Pig tons, 100		Henderson Bros. Pig tons, 100	
Kopplemann A. Wrought locomotive parts, pcs., 10; cs., 1		Kopplemann A. Wrought locomotive parts, pcs., 10; cs., 1	
Lang W. Bailey & Co. Bundles, 420		Lang W. Bailey & Co. Bundles, 420	
Bars, 115		Bars, 115	

OLD METALS, PAPER STOCK, &c.

Nothing of importance has occurred in the market for Old Metals, Paper Stock, and other junk materials during the period that has elapsed since the date of our last. There has been a better demand for Book Stock and Grass Rope; but for other articles the call has somewhat decreased. Old Metals still continue dull, and prices display weakness. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16¢ @ 17¢ per lb.; Yellow Metal, 11¢; Brass, 10¢ @ 12¢; Composition, heavy, 13¢ @ 14¢; Lead, solid, 5½¢; Tea Lead, 4½¢; Zinc, 4½¢ @ 4¾¢; Pewter, No. 1, 18¢; do, No. 2, 3¢ @ 12¢; Spelter, 5¢ @ 5½¢; Wrought Iron, 1½¢; Sheet do, ¾¢; Cast, do, ¾¢; Machinery, do, ¾¢; Rags, &c.—Canvas, Linen, 5¢ @ 5½¢; do, Cotton, No. 1, 6¢ @ 6½¢; No. 2, 2½¢; White, No. 1, 6½¢; No. 2, 4½¢; Colored, do, 2¢ @ 2½¢; Mixed, Woolen, 2¢ @ 3¢; Soft, do, 5¢ @ 5½¢; Gunny Bagging, 1¢; Jute Butte, 1½¢ @ 2¢; Kentucky Bagging, 3¢; Book Stock, 3¢; Waste Paper and Scraps, 1½¢; Kentucky Bale Rope, &c.; Oakum, No. 1, 1½¢ @ 5¢; do, No. 2, 3¢; Tanned Shaking, 1¢ @ 1½¢; Grass Rope, 2½¢ @ 2¾¢.

COAL.

The situation at the mines still continues unchanged. The strikers have now held out for three months without showing any intention to go to work on the terms offered by their employers. The general dullness of trade is rather an advantage to the companies, since they are not called upon to supply a large demand for Coal, while it is a disadvantage to the miners, because the scarcity of money cuts off, to a large extent, the assistance they might otherwise get from sympathizing labor organizations. The companies, beside, have on hand large stocks of Coal from which to draw while the strike lasts, so that the stoppage of the mines causes no serious loss to them at present. The Lehigh and Wilkesbarre Company have over 100,000 tons of Coal stored below Mauch Chunk, and the other great companies have still larger amounts on hand.

The Coal which usually passes over the Erie Railroad to supply places along the line, has been detained by the carrying away of the bridge at Port Jervis, and there is a local scarcity. The supply in this city, however, is not affected, as it arrives principally at Hoboken and Elizabethport by other lines.

The committee of the Associated Coal Companies, at their monthly meeting for April, agreed to advance prices 20 cents per ton.

As the men in the Schuylkill region have shown no disposition to go to work, the Philadelphia and Reading Coal and Iron Company have agreed to issue no prices for April. The following is their circular to their customers:

PHILA. AND READING COAL AND IRON CO.,
NEW YORK, March 20, 1875.

There being no prospect of the miners and laborers in the coal region resuming work in time to produce coal during the month of April, no price circular for that month will be issued. Respectfully yours,
E. A. QUINTARD, General Sales Agent.

THE NEW YORK COAL EXCHANGE,
NEW YORK, March 20, 1875.

At a meeting held this day, the following resolution was adopted:
Resolved, That inasmuch as there is no immediate prospect of a resumption of work in the Lehigh Region, it is the sense of this Exchange that no prices should be made for Lehigh Coal for the month of April.

E. BELKNAP, Secretary.

We quote as follows: Anthracite, \$4.00 @ \$5.40; Cumberland, \$6.50 @ \$6.75; West Virginia, \$6.50 @ \$7; James River Steam, \$6.25; James River Carbonite, \$9; Kanawha House, \$14.25; American Gas, \$7 @ \$7.25; American Cannel, \$12 @ \$14; Pennsylvania and Westmoreland, \$7.25; Murphy Run, \$7.40; Newburg Orrel, \$7.50; Sterling Ohio, \$12; Ince Hall, \$17 @ \$18; Liverpool House Cannel, \$17 @ \$18; Liverpool Gas, \$11; Newcastle Gas, \$7.25 @ \$8; Scotch, \$9.

The Coal transported over the Cumberland Branch Railroad during the week ending March 27, 1875, amounted to 964 tons, as against 2910 tons shipped in the corresponding period of last year, showing a decrease of 1946 tons. Over the Cumberland and Pennsylvania Railroad, for the same period, the shipments were 31,593 tons, against 27,807 tons shipped in 1874, an increase of 3786 tons. The aggregate amount of Cumberland Coal shipped by the various companies so far this year amounts to 257,680 tons.

PHILADELPHIA.

PHILADELPHIA, March 30, 1875.

The market has hardly been as active this as last week, and prices, whilst being maintained, have not shown the firmness noticeable during the first few months of the coal strike. Considerable transactions, however, both in Pig and Manufactured Iron, have been made. Judging from the number of inquiries the month of April will show a very decided improvement in the demand. The wear and tear of such a severe winter as we have just passed through will undoubtedly cause an improved demand for new Iron for repairs of railroads—greater in this than in former years, as owing to the financial depression of last winter most of the roads contented themselves with "patching up." This year, however, that shift will be hardly left to them; as a consequence a fair demand from this cause alone is confidently anticipated. Already some large orders for Iron Rails have been placed, and there is every indication that this long neglected industry will have a share of business of which it has been long deprived. Quotations of

New Rails.—Are from \$49 to \$53, at mill, at which figures I note sales, 2500 tons 56 lbs., 1800 tons 50 lbs., 2100 tons lighter Narrow Gauge Rails.

Pig Iron.—Foundry No. 1, \$27 to \$28; No. 2, \$24 to \$26. Gray Forge, \$24 to \$25. Sales include 2500 tons No. 1, 3000 tons No. 2, 2000 tons Gray Forge, at the quotations. Mill Iron is firmer than Foundry, the Red Short especially.

Old Rails.—Quoted \$30, at which price transactions amounting to some 2300 tons have been made.

MUCK BARS.—Sales amount to 1000 tons at \$42 to \$44, at mill.

SCRAP.—No. 1 wrought, 300 tons, at \$34.

PITTSBURGH.

PITTSBURGH, March 30, 1875.

Pig Iron.—There has been no movement whatever in Pig Iron this week, the sales in the aggregate not exceeding 150 tons, all of which was of foundry grades, and in small lots ranging from 10 tons up to 50; not a single ton of mill iron reported. The mills have been out of the market ever since early in February, when they bought pretty freely in anticipation of an early dissolution of the lock-out. Having been badly deceived then, it is not likely that they will enter the market again until they are in actual need, or until the furnaces have been started up, as there is no inducement in the present condition of affairs to stock up when there is a possibility that the puddling furnaces may remain idle until fall. However, notwithstanding the consumption has been very much curtailed by the stoppage of 80 furnaces, not only here but at Cleveland and in the Shenango and Mahoning valleys, there has been a large falling off in the production, also, which, taken in connection with the fact that the stock of standard forge is not near as large as was generally believed, causes producers to be hopeful in regard to the future, and there is no disposition to make concessions in order to effect sales; in other words, the feeling prevails that it is good property at current rates, and that as soon as the mills start up and there is a demand for it that prices will advance. It is worthy of notice that Pig Iron has been lower here, relatively, for a year or more past than elsewhere, and there is reason to believe that it will appreciate in value just as soon as the lock-out is ended, which may take place in a week, and it may hold out until fall—here is where the trouble lies. Prices are nominally unchanged. No. 1 Foundry, \$27 to \$28; No. 2 do, \$25 to \$26; Gray Forge, \$23 to \$24; White and Mottled, \$20 to \$22. No movement in Muck Bar; there appears to be little or none offered from the West, and that from the East is held above the views of buyers, and, beside, the quality is not satisfactory.

MANUFACTURED IRON.—There is nothing particularly new or important to report in the market for forged Iron. Business continues considerably demoralized, and there will be no improvement until the labor trouble has been disposed of. The most of the mills are still in operation, as they are still able to pick up enough Muck Bar and Scrap to keep them going, but they have no assortment, and are unable to do much for want of sizes, and our manufacturers generally have been compelled to turn away orders in consequence. The Western markets are reported firmer in consequence of the diminished production here and

elsewhere, and the strike has been productive of one good result—it has enabled manufacturers to work off all the old stock they have had on hand for several years, and they are now in good shape for starting up, although this they will not do until the boilers are satisfied to comply with their (the manufacturers') terms.

NAILS.—There is little or nothing doing in Nails, nor will there be any improvement as long as the lock-out continues; nearly all the factories are stopped, manufacturers have no stock, and are not soliciting orders, as they could not fill them for want of stock, and as there are no sales there are no established rates. As might be expected, our manufacturers feel very much aggrieved in consequence of being forced to refuse orders, to compel old customers to buy elsewhere, but there is no help for it.

STEEL.—The Steel mills are all in operation. Some of them, including the Black Diamond (Park & Co.), are working up to their full capacity, and the indications are favorable for a good spring and summer trade. The complaint is in regard to prices, which, it is said, are down to a point that affords little or no margin for profit.

SCRAP IRON.—There is a continued steady demand for No. 1 Wrought, and with a limited supply on the market, prices are firm but unchanged; dealers quote at \$33 to \$34, buying, and \$35 to \$38, selling, delivered free at mills. Cast Iron Scrap is dull. Scrap Steel continues in limited supply, but there does not appear to be much inquiry for it.

TIN LOCK-OUT.—There is nothing particularly new or important to record in regard to the lock-out; rumors are as numerous as ever, but the general situation remains unchanged. Mill owners, if anything, are becoming more and more determined not to start up until the puddlers are satisfied to accept the reduction or the price of iron advances sufficiently to enable them to pay the old rates, while the puddlers, on the other hand, appear to be about as determined as the manufacturers.

The Pittsburgh Commercial of March 24th says: "The week just closed was decidedly the dullest we have experienced in the Iron market for many years. The sales, all told, comprise 145 tons. The demoralization of trade is complete, at least so far as relates to Iron. Buyers have evidently absented themselves so long that there is no demand for Manufactured Iron. The raw material is not wanted. The following sales are reported:

BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.

50 tons white, \$30.00—cash.

45 tons No. 1 foundry, H. R., \$30.00 @ 32.00—4 mos.

10 tons No. 1 foundry, H. R., 32.00—4 mos.

CONNELLYVILLE COKE.

20 tons No. 2 foundry, \$24.50—4 mos.

10 tons No. 2 foundry, 24.00—cash.

ANTHRACITE.

10 tons No. 2 foundry, \$25.50—4 mos.

ST. LOUIS.

MESSRS. SPOONER & COLLINS, Iron Commission Agents, 409 North Third street, St. Louis, under date of March 20, report the Iron market as follows: "No special change since our last report. The demand for Foundry Iron has been light the past week, though Mill Iron continues good. Our prices are firm at last week's quotations. We quote on four month's time:

Mo. Stone Coal, No. 1 F'dry, \$30.00 @ 32.00—4 mos.

" No. 2 F'dry, 28.00 @ 30.00—4 mos.

" No. 1 Mill, 30.00 @ 32.00—4 mos.

" No. 2 F'dry, 28.00 @ 30.00—4 mos.

" No. 1 Mill, 30.00 @ 32.00—4 mos.

" No. 2 F'dry, 28.00 @ 30.00—4 mos.

" No. 1 Mill, 30.00 @ 32.00—4 mos.

" No. 2 F'dry, 28.00 @ 30.00—4 mos.

" No. 1 Mill, 30.00 @ 32.00—4 mos.

" No. 2 F'dry, 28.00 @ 30.00—4 mos.

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" No. 1 Mill, 30.00 @ 32.00—4 mos.

" No. 2 F'dry, 28.00 @ 30.00—4 mos.

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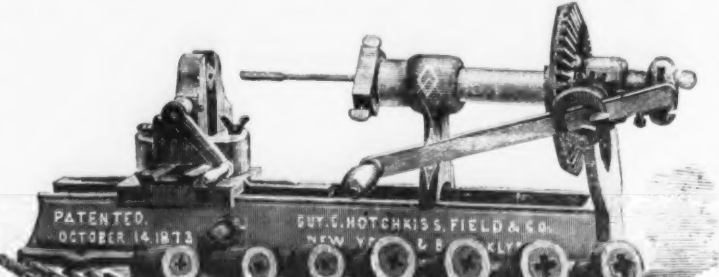
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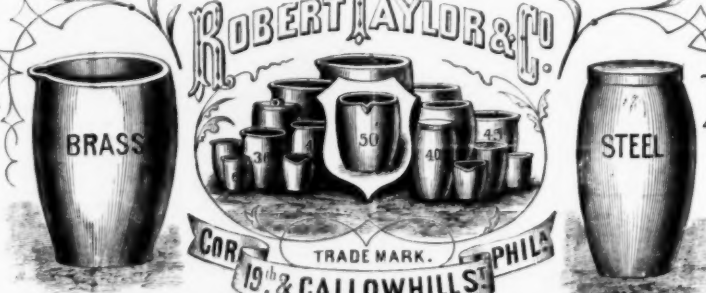
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This is by far the most powerful Iron Cutter in use which can be worked by hand, having three times the capacity of any other machine which sells at the same price. The No. 3 machine occupies a space of 12x30 inches; when in use additional space must be had for the lever to work in. We send two sets of knives with each machine—one for square and flat, the other for round iron and steel. By using the knives adapted to it, round iron is cut without being flattened. One man can cut the largest size iron named above, but two would be required for steady work. It does not take a minute to change the knives or to shift the machine from large to small sizes.

AUGUSTA, GA., March 3, 1875.
MILLERS FALLS CO.—Enclosed find draft for amount of invoice, January 7. We would have sent the amount before, but did not have an opportunity of trying the Iron Cutter until a few days ago. It is one of the best machines we ever saw.
Yours, truly,
MOORE & CO.

Office of the ATHENS FOUNDRY AND MACHINE WORKS,
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H. L. PRATT, President.—Dear Sir: Enclosed find draft made payable to your order by Messrs. Childs, Nickerson & Co., in payment for Iron Cutter. We have put our Cutter to good service, and find it cuts readily 1 1/2 round, and 3/4 x 1/2 square iron. C. N. & Co. are pleased with theirs, say it will save many a blow and cold chisel in their iron house.
Truly, yours,
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We make a satisfactory discount to dealers, and warrant the cutters to do all which we claim for them. Send for prices.

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Sole Proprietors and Manufacturers of the
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TUBE SCRAPPERS, FAMILY TOOL CHESTS,
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(ESTABLISHED 1843.)



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The best English Anvils, after a time, become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Eagle Anvil being of crystallized iron, no such settling can ever occur; and the steel face, therefore, remains perfectly true. Also, it has the great advantage of being of a more solid material, and consequently with less rebound, the piece being forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as with a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one-fifth lighter than that required when using a wrought iron anvil which is more elastic.

The working surface is in one piece of JAS. W. BENT'S BEST TOOL CAST STEEL, which, after being accurately ground, is hardened and given the proper temper for the heaviest work. The body is covered with and its extremity made entirely of steel. The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.

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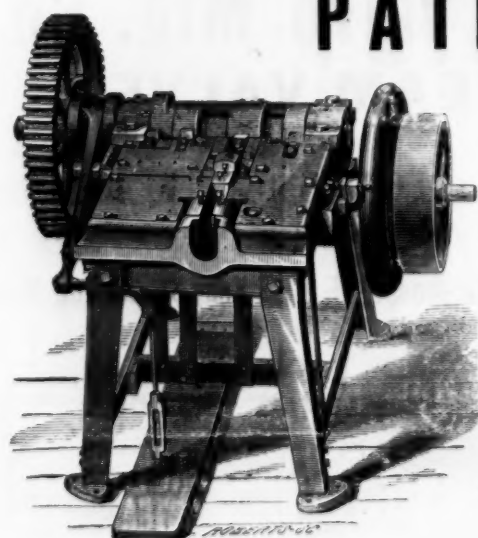
It will command itself for simplicity, durability, quality and quantity of work over all others.

It will make perfect Square or Hexagon Bolts, in from 3 to 5 revolutions, and runs at the rate of one hundred and twenty revolutions per minute. Plough, Track, Button-head Bolts, and all similar heads are made with one revolution.

To show that it will stand the test of long continued strain, it has made eleven tons of half-inch Bolts from one-and-a-quarter to two-and-one-half inches long; eighteen tons five-eighths Bolts; twenty-six tons three-quarter Bolts, and thirty seven tons seven-eighths Bolts, by one set of dies for each size, without change or repairs. It makes and cuts off the bolt from the heated bar, from one to ten inches, or of any greater length cut for the purpose, and either round or square iron may be used.

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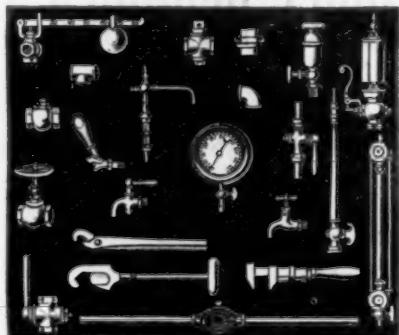
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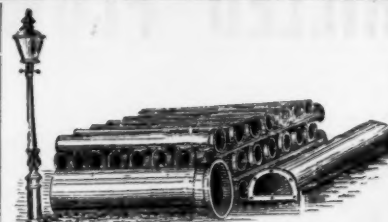
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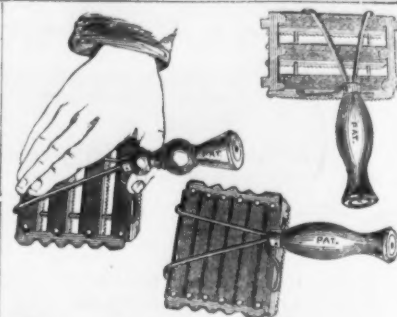
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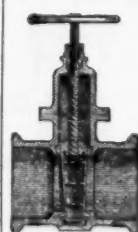
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Amberg File Works, Auburn, N. Y.
Bailey & Co., 100 West 12th, N. Y.
Nicholson File Co., Providence, R. I.
Weaver, Clemons & Co., 100 West 12th, N. Y.
Western File Works, Beaver Falls, Pa.

Fire Brick,

[illegible]

General Tool Co., 353 Classon Ave., Brooklyn, N. Y.	30
Leak Dealers and Brokers.	
Carl Edward W., 205 Walnut, Phila.	4
Curt N. L. & Co., 231 & 232 Water, N. Y.	2
Crane Bros. Mfg. Co., 118 Walnut, Phila.	6
Crocker Bros., 32 Cliff, N. Y.	3
Griggs H. L. Co., 138 Walnut, Phila.	7
W. J. Hammond, Pittsburgh, Pa.	9
Quincy, Dodge & Co., Cliff, bet. John & Fulton, N. Y.	2
Quincy, J. W., 48 William, N. Y.	1
Sturges Frank & Co., 72, 74 & 76 Lake, Chicago.	3
Wentworth W. H. & Co., West 4th Water, N. Y.	1
Van Wart & McCoy, 131 and 133 Duane, N. Y.	1
Heating Stoves.	
Barton, Elliott, 329 Walnut, Phila.	1
Drown Thomas M., Lafayette College, Easton, Pa.	4
Maynard & Van Rensselaer, 26 1/2 Broadway, N. Y.	6
Mining Spikes.	
Rosberry Geo. D., Pottsville, Pa.	1
Joseph Boyd's Sons, Franklin N. Y.	1
Holding Machines, Makers of	
Corliss P. & F., New Britain, Ct.	34
Molders' Tools.	
Cartier H., 290 Pearl, N. Y.	1
Hay Horse Mfg. Co., Buffalo, N. Y.	10
House Traps, Catchmentals, Makers of	
Pietz R. E. 31 and 33 Clinton, N. Y.	40
Nail Pullers, Makers of	
Maltby, Curtis & Co., 82 Reade, N. Y.	1
Union Hardware Co., 125 Chambers, N. Y.	1
Nickel Plates.	
Marshall John, 102 Ridge avenue, Philadelphia.	1
New York Nickel Plating Co., 133 West 23d, N. Y.	1
Oil Barrels, Makers, Rulers of	
Rowland Wm H. & Co., East 4th Water, N. Y.	1
Oil Broker.	
Ballou E. W., 3 and 5 Wall, N. Y.	1
Rails, Bolts, etc., Makers of	
American Bolt Co., 210 Lawrence, Lowell, Mass.	13
Carpenier David, 402 Water, N. Y.	1
Clark Bros. & Co., Milldale, Conn.	12
Fuller, Lord & Brown, 13 Reed, N. Y.	12
Haskell W. H. & Co., Pawtucket, R. I.	12
Hoopes & Townsend, 123 Bedford, Phila.	12
Howe, Lord & Brown, 13 Reed, N. Y.	12
New Haven & Nut Co., Westville, Ct.	12
Los Colony Iron Works, 116 Chambers, N. Y.	12
Russell, Burdett & Ward, Port Chester, N. Y.	12
Shelton C. & Co., Buffalo, N. Y.	40
Stenberg J. H., Reading, Pa.	13
Oil Stones.	
Boyd & Chase, 107th street and 1st avenue, N. Y.	32
Wetzel E. F. W., 73 Warren, N. Y.	32
Old Iron, etc.	
Gregg H. & Co., 103 Chestnut, Philadelphia.	3
Ornamentals.	
Blake Crusher Co., New Haven, Ct.	38
Peckering Oliver & Co., 115 Queen, Philadelphia.	38
Glandling Jay & Co., 115 Queen, Philadelphia.	38
Paints.	
Rock Mountain Vertical Paint Co., Prov., R. I.	32
Steele F. & Co., 117 Fulton, N. Y.	32
Patent Solicitors.	
A. V. Briesen, 263 Broadway, N. Y.	20
Arthur Frazer, 37 Park Row, N. Y.	20
Cox & Co., 233 Broadway, N. Y.	20
Hawson & Son, Phila. and Washington, D. C.	20
Stelton T. D., Scientific American, 37 Park Row, N. Y.	20
Picks, Mattocks, etc., Makers of	
Collins Geo., 34 Hartford, Ct.	16
Picture Nails.	
Richards T. C. & Co., 47 Murray, N. Y.	1
Pistons, Fittings, etc., Makers of	
Eaton, Cole & Burnham, 136 John, N. Y.	1
Meyer Henry C. & Co., 48 Cliff, N. Y.	1
McCab & Harlin & Co., 136 John, N. Y.	1
Nelson & Finkle, 40 E. 4th, N. Y.	1
Parsonet & Mangle, 221 Park, Phila.	26
Plates, Rulers of	
Converse M. D., 68 Park Place, N. Y.	1
Empire Mfg. Co., 18 William, N. Y.	39
Pipe, Wrought and Cast, Makers of	
Brick R. A. & Co., 112 Leonard, N. Y.	6
Brick R. A. & Co., 112 Leonard, N. Y.	6
Morris, Tucker & Sons, Burlington, N. J.	6
National Tube Works Co., 78 William, N. Y.	26
Warren Foundry & Sons, Camden, N. J.	6
Wood R. D. & Co., 178 Broadway, N. Y.	26
Planed Boards, etc., Makers of	
Candell John & Co., 1321 Fairmount Ave., Phila.	33
Plane Irons, Manufacturers of	
Backlund & Co., 1321 Fairmount Ave., Phila.	11
Middletown Tool Co. & 21 Cliff, N. Y.	11
Planes, Manufacturers of	
Greenleaf Tool Co., 1321 Fairmount Ave., Phila.	18
Stanley Rule & Level Co., 35 Chambers, N. Y.	18
Plated Ware	
Derby Silver Co., Derby, Ct.	40
Rogers & Bro., 233 Broadway.	40
Plows, Chilled Iron, Makers of	
Son Beutler Iron Works, 109 South Bend, Ind.	24
Plumbing Lubricator.	
Joseph Dixon Crucible Co., Jersey City, N. J.	1
Plumbing, Manufacturers of	
Car Wm S. & Co., 108 Centre, N. Y.	26
Printable and Stationary Forms.	
Metcalfe & Co., 100 John, N. Y.	9
Power "ammers, Makers of	
Freese, Power & Co., Manchester, N. H.	33
The Siles & Parker Press Co., Middletown, Ct.	33
Presses, Makers of	
Sturtevant R. F., 72 Sudbury, Boston.	40
Pulverizer Pump.	
Hall G. Henry & Co., 20 Cortland, N. Y.	28
Pumps, Makers of	
Burlington & Purdy, 113 Chambers St.	7
Busch W. B. & Co., 123 Market, Conn.	7
Union Mfg. Co., 98 Chambers.	7
Valley Mch. Co., Easthampton, Mass.	7
Promoters.	
Brown Edward, 31 Walnut, Phila.	1
Railroad Supplies.	
Durchnick W. & Co., 12 John, N. Y.	16
Foster Hoffman & Co., 150 Liberty N. Y.	6
Rails, Importers of	
Allen Bros. & Co., 104 and 106 John, N. Y.	1
Rails, Iron or Steel, Makers of	
Atkins Bros., 241 Market, Pa.	37
Cambria Iron Co., 10 John, N. Y.	1
Cleveland Rolling Mill Co., Cleveland, O.	1
McGowan & Co., 100 Troy, N. Y.	1
Milwaukee Iron Co., Milwaukee, Wis.	36
Railways Truck Tools.	
Metcalfe & Co., 100 John, N. Y.	33
Razor Straps, Makers of	
B. F. Rader, Charleston, Mass.	26
Razors.	
Irron E. B. Jr., & Co., 230 N. 2d, Philadelphia.	1
Rivets.	
Youngs River Works, 116 Chambers, N. Y.	1
Tammes Peter, 231 North 4th, Brooklyn, E. D.	1
Road "crappers &c., Makers of	
Wheeler & Co., 113 Chambers, N. Y.	18
Rolling Mill Machinery, etc., Manufacturers of	
Birmingham Iron Foundry, Birmingham, Ct.	4
Rolling Mill Machinery, etc., Manufacturers of	4
Rules, Manufacturers of	
Steele F. & Co., 117 Fulton, N. Y.	32
Stevens & Co., Riverton, Ct.	18
Salt Deposits Co.	
Steele F. & Co., 117 Fulton, N. Y.	32
Sand and Emery Paper, Makers of	
Steele F. & Co., 117 Fulton, N. Y.	32
Sash Weights (sectional), Manufacturers of	
Sprague Sash Weight Co., Youngstown, O.	7
Hammond W. S., Lewisburg, Pa.	35
Saws, Makers of	
Boyd & Chase, 107th street and 1st avenue, N. Y.	32
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Boyd & Chase, 107th street and 1st avenue, N. Y.	

Steam Pump Works, Warren, Mass......
Leavitt Hydraulic Works, cor. Evelina and
Levant, Philadelphia,.....
Lebanon Traps,.....
Lester & Co., Rochester, N. Y.,.....
Jos. Alonzo L. St. R. 4th Phila......
Thomas & Wm. C. 25 Ledger Place, Philadelphia,.....
Keweenaw & Blosing, Albany, N. Y.,.....
Lee & Hastings,.....
The Melville Steel Castings Co., Evelina and Levant
Streets, Philadelphia,.....
Lee Importers,.....
Clark J. & Riley, 82 John, N. Y.,.....
Locke Bros., Sheffield, England,.....
Longreave Chas. & Son, 104 and 106 John, N. Y.,.....
Hobson Francis & Son, 97 John, N. Y.,.....
Cleveland Rolling Mill Co., Cleveland, O.,.....
Moss V. W. 30 John, N. Y.,.....
Peterson & Co., 24 Broadway,.....
Sanderson Geo. & Co., 31 John, N. Y.,.....
Wade & Sons, 91 and 93 John, N. Y.,.....
Wargow & C., 30 John, N. Y.,.....
W. H. Hawksworth, Ellison & Co., 72 John, N. Y.,.....
Anderson & Woods' Pittsburgh,.....
Chrome Steel Co., Brooklyn, E. D.,.....
Gautier D. G. & Co., Jersey City, N. J.,.....
Farist & Windsor Bridgeport, Ct.,.....
Russell & Co., New York,.....
Hussey Wells & Co., Pittsburgh,.....
Biller Bar & Parkin, Pittsburgh,.....
Reese, Graf & Woods, Pittsburgh,.....
Rowland Wm. & Harvey, Frankford Pa.,.....
Smith, South & Co., Pittsburgh, Pa.,.....
Stinger, Slunk & Co., Pittsburg,.....
Tops (Water Gas &c.) Makers of
Stone Crushing Machines,.....
Shepard Sidney & Co., Buffalo, N. Y.,.....
Thore Polish, Makers of
Singer, Slunk & Co., Jersey City, N. J.,.....
Travis Drills, Makers of,.....
Worcester Twist Drill & Mach. Co., N Bedford Mass.,.....
Burr & Co., 31 Beek Slip, N. Y.,.....
Newfield Block Works, Lockport, N. Y.,.....
An American Tack Co., 117 Chambers, N. Y.,.....
Dunar, Hobart & Co., 118 Chambers, N. Y.,.....
Field A. & Sons Trenton, Mass.,.....
Grundy & Kenworthy, 165 Greenwich, N. Y.,.....
Hayes Bros., Manufacturers of,.....
Shelton Co., Birmingham, Ct.,.....
Free Presses, Makers of
Huber & Co., New York,.....
Hydraulic Water Wheel, &c.,
Swain A. M., North Chelsea, Mass.,.....
Hubbard Richard, 21 Columbia, N. Y.,.....
Niles, Jos. Water and Steam,.....
Chapman Valve Co., 75 & 77 Rully, Boston,.....
Valve Lift Mfg. Co., Troy, N. Y.,.....
Ventilators,.....
Bracher F. W. 7 Greene, N. Y.,.....
Isacs,.....
Backus Vice Co., 73 Beckman, N. Y.,.....
Fisher & Norris Trenton, N. J.,.....
Trenton Vice & Tool Works, 101 & 103 Duane, N. Y.,.....
Water Pillars,.....
Jewett John C. & Sons, Buffalo, N. Y.,.....
Yielding Compositions,.....
Scherloh H. 21 Exchange Place, Jersey City, N. J.,.....
White Lead, Manufacturers of
Brooklyn White Lead Co., 89 Maiden Lane, N. Y.,.....
Colgate Robert & Co., 25 Pearl, N. Y.,.....
Jewett John & Sons, 182 Front, N. Y.,.....
James Smith & Sons, 101 Front, Phila., Pa.,.....
Wetherill & Bro., 31st, below Chestnut, Phila.,.....
Window Screens, Makers of
Hammond N. S. & Co., Newberry, Pa.,.....
Wire Goods, Manufacturers of
Gilbert & Bennett Mfg. Co., 273 Pearl, N. Y.,.....
Holyoke, Mass.,.....
Roberts Henry, Newark, N. J.,.....
Washington & Moen Mfg. Co., Worcester, Mass.,.....
Trenton Iron Co., Trenton, N. J.,.....
Wire Expanses,.....
Barnum E. C., Detroit, Mich.,.....
Gilbert & Bennett Mfg. Co., 273 Pearl, N. Y.,.....
London, N. Y.,.....
Parker Sam'l & Co., Wethersfield, Ct.,.....
Tyler W. S., Cleveland, O.,.....
Wire Fences, Makers of
Roebling's John A. Sons, Trenton, N. J.,.....
Wood Tools, Makers of
Gibson E. P. 27 Haycock, Phila.,.....
Wrenches, Manufacturers of
Austin & Co., 118 Fulton, N. Y.,.....
Bemis & Call's & Tool Co., Springfield, Mass.,.....
Co. A. G. & Co., Worcester, Mass.,.....
Forbes & Co., Worcester Mass.,.....
Wrighters
Alexander T. J., Olive and High, Boston,.....

A. G. COES
PAT. DEC. 26, 1871.

Established in 1839.

A. G. COES & CO.
WORCESTER,
Mass.,
Manufacturers of
THE GENUINE
'COES'
SCREW WRENCHES.

Our goods have been very much improved recently, by making the **Bar WIDE**, as shown in the cut, which makes 1 1/2 in. Wrenns as strong as 1 1/8 in. made in the ordinary way, and by using

A. G. COES'
NEW PATENT
FERRULE

Which cannot be forced back into the handle.

Our goods are manufactured under Patents dated Feb 29, 1871, May 2, 1871, and Dec. 26, 1871, and are of superior quality either will be rigorously prosecuted.

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

A. G. COES & CO.
STAR FIRE BRICK HARBISON
Manufacturers of Benezet and
BENEZET

Office and Works, Twenty-Second Street, New York.

For steel bolts, nuts, Furnaces, Steel Mills and Boilers, Furnaces, Arches, &c. Benezet let For Roll Foundries, and Hot Furnace &c. King &c. Lion &c.

B. KREISCHER & SON.,
New York Fire Brick &
STATEN ISLAND
CLAY RETORT WORKS.

HENRY DISSTON & SONS, Keystone Saw, Tool, Steel and File Works.

Front and Laurel Streets, Philadelphia.

Branch Works, Tacony, Philadelphia.

Branch House, Randolph & Market Streets, Chicago, Ill.

MANUFACTURERS OF

SHEET STEEL, and all Articles made from Sheet Steel.

SAWS OF EVERY DESCRIPTION.

Also, FILES, TOOLS, Etc., and all kinds of Labor Saving Implements for keeping Saws in perfect order.

HENRY DISSTON & SONS' PATENT STAR SAW SET.

DESCRIPTION.

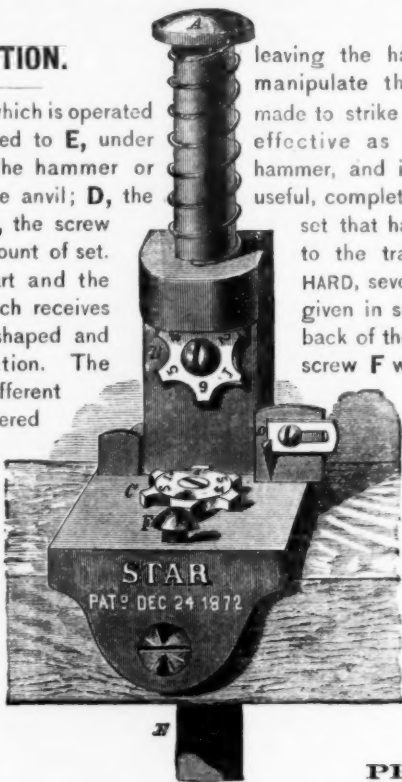
A is the plunger, which is operated by a treadle attached to E, under the machine; B, the hammer or striking part; C, the anvil; D, the movable gauge; F, the screw to regulate the amount of set.

The striking part and the anvil, or portion which receives the blow, are star-shaped and similar in construction. The points are all of different sizes, and are numbered from 1 to 6, and are designed to set different size teeth. Prominent among its advantages is the fact that it can be operated wholly by the foot by means of a treadle, thus

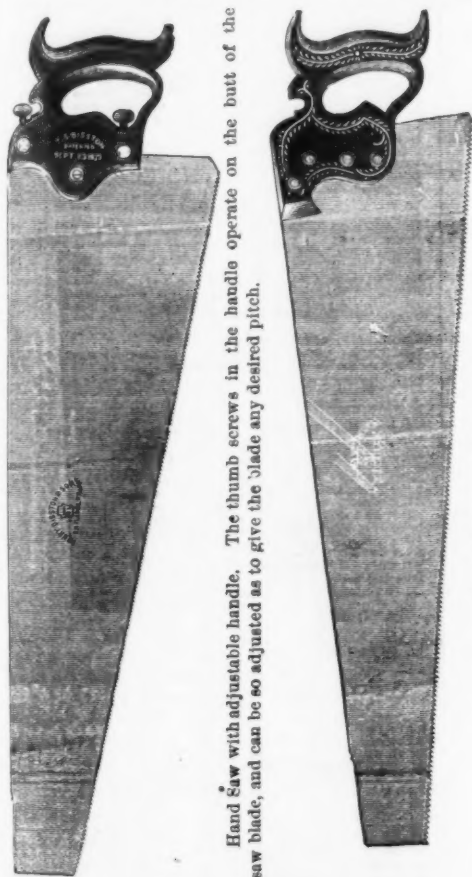
leaving the hands to guide and manipulate the saw. It can be made to strike a blow as sharp and effective as though done by a hammer, and is at once the most useful, complete, and effective saw

set that has ever been offered to the trade. If the saw is HARD, several blows should be given in setting it. Raise the back of the saw from the guide screw F when the first blow is

given, and gradually lower it with each blow until the process is complete. Thus many a good saw will be saved from utter ruin. A trial will suffice. Be sure to clean the saw teeth before setting.

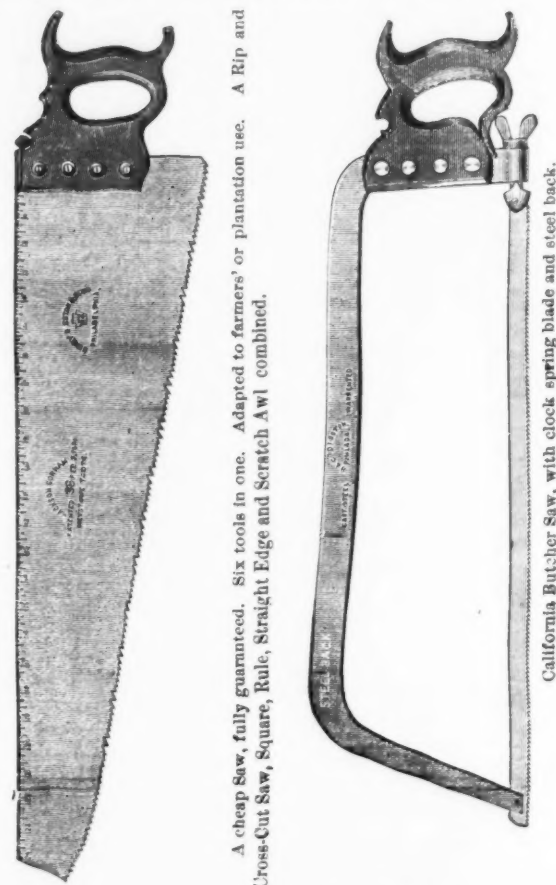


PRICE, \$1.50.



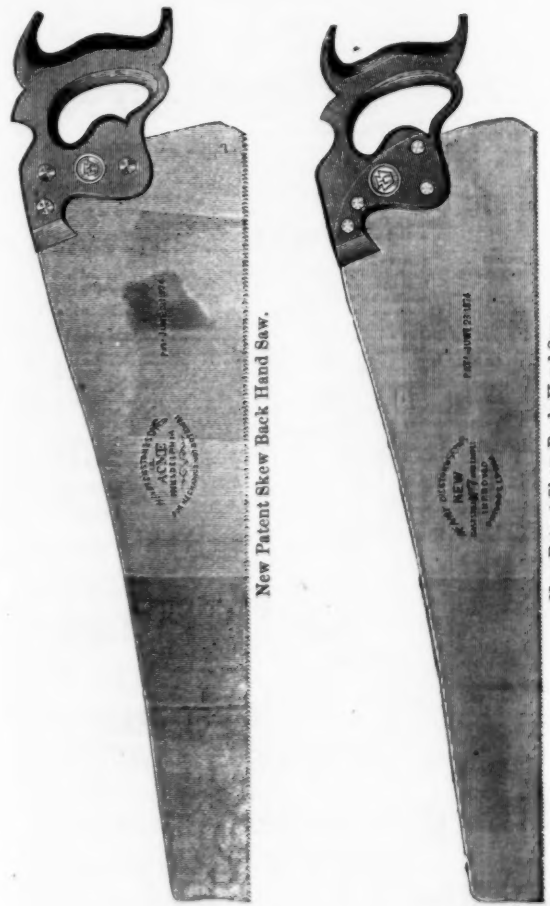
Hand Saw with adjustable handle. The thumb screws in the handle operate on the butt of the saw blade, and can be so adjusted as to give the blade any desired pitch.

Game Cock Hand Saw—a perfect beauty.



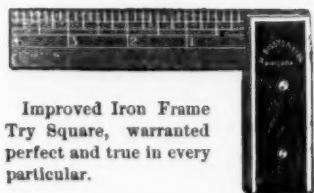
A cheap Saw, fully guaranteed. Six tools in one. Adapted to farmers' or plantation use. A Rip and Cross-Cut Saw, Square, Rule, Straight Edge and Scratch Awl combined.

California Butcher Saw, with clock spring blade and steel back.



New Patent Skew Back Hand Saw.

New Patent Skew Back Hand Saw.

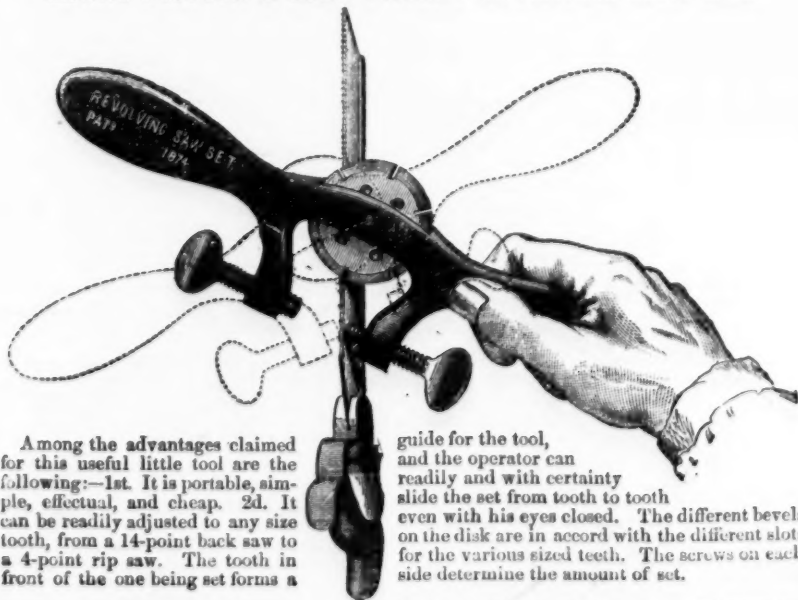


Improved Iron Frame Try Square, warranted perfect and true in every particular.



Patent Adjustable Gauge Saw for sawing tenons, kerfing, or any work where the cut is required to be of definite depth. Will pay for itself in one day. Try it and be convinced. Remove the gauge and use as an ordinary saw.

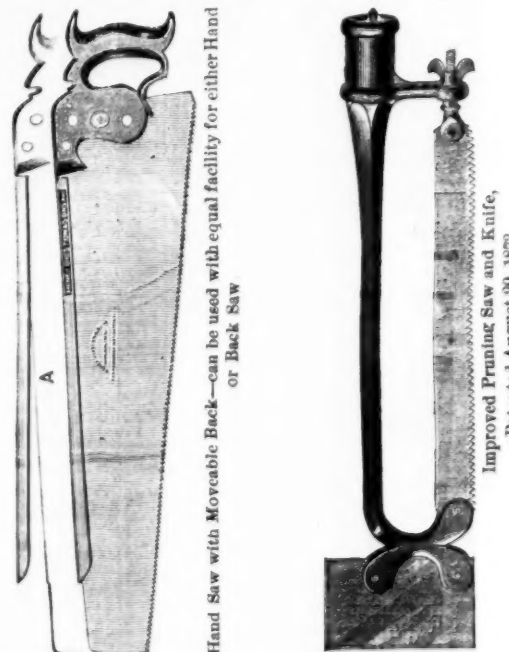
HENRY DISSTON & SONS' PATENT REVOLVING SAW SET.



Among the advantages claimed for this useful little tool are the following:—1st. It is portable, simple, effectual, and cheap. 2d. It can be readily adjusted to any size tooth, from a 14-point back saw to a 4-point rip saw. The tooth in front of the one being set forms a

guide for the tool, and the operator can readily and with certainty slide the set from tooth to tooth even with his eyes closed. The different bevels on the disk are in accord with the different slots for the various sized teeth. The screws on each side determine the amount of set.

No. 1, large size, - 75 cents.
" 2, small " - 50 "



Hand Saw with Movable Back—can be used with equal facility for either Hand or Back Saw.

Improved Pruning Saw and Knife, Patented August 29, 1873.



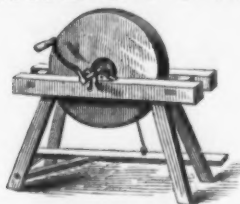
Compass Saw, Keystone Tooth, it cuts with or across the grain with equal facility.



Hack Saw. The blade in this saw is reversible, an advantage which will be readily appreciated by mechanics.

[illegible]

Grindstones, Emery, &c.

Walter R. Wood,
GRINDSTONES.SOLE AGENT OF THE
BEREA STONE CO., of Ohio,
NOVA SCOTIA and other brands.
283 & 285 Front Street, New York.

Grindstones.

AMHERST,
INDEPENDENCE,
LAKE HURON,
AND BEREA.

Also Scythe Stones.

WORTHINGTON & SONS, Mfrs.,
North Amherst, Ohio.OIL STONE.
BOYD & CHASE,
388 to 406 East 107th St., N. Y.
The largest manufacturers in the world of
Arkansas, Washita and Genuine
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Send for circular. Orders solicited from the trade.

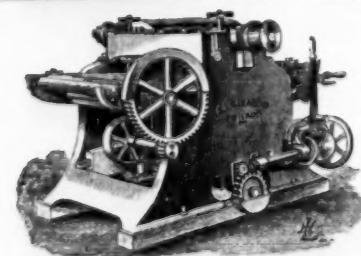
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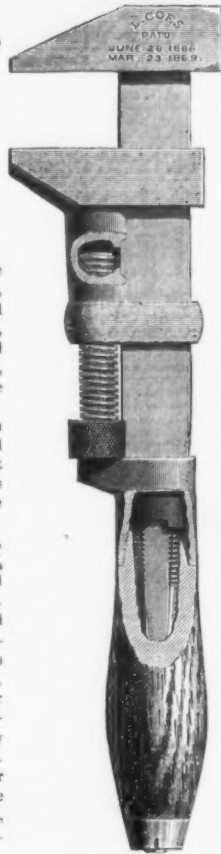
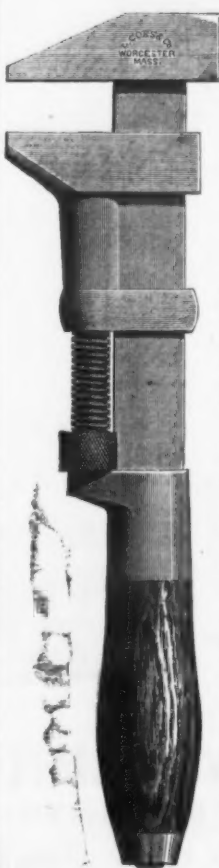
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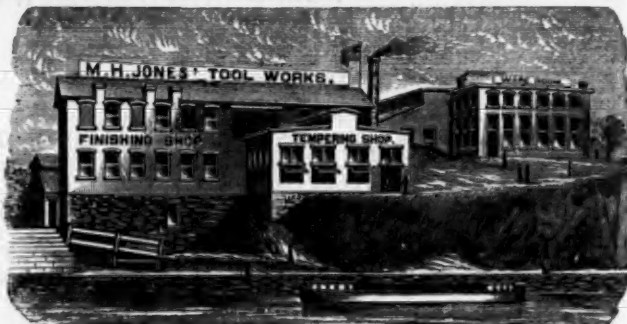
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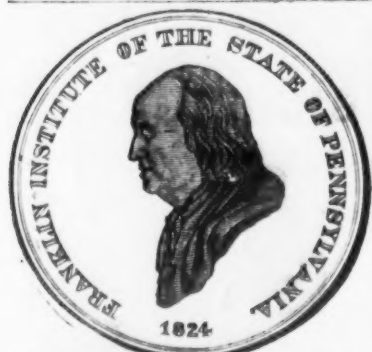
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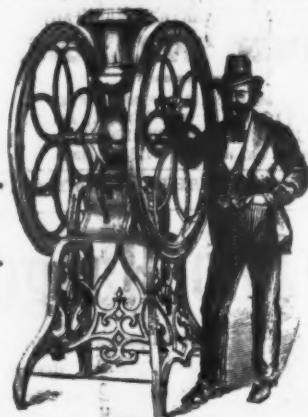




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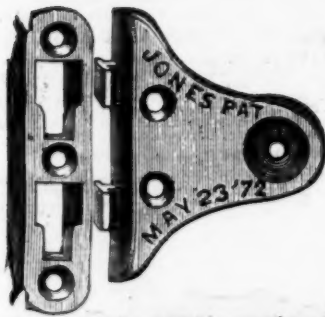
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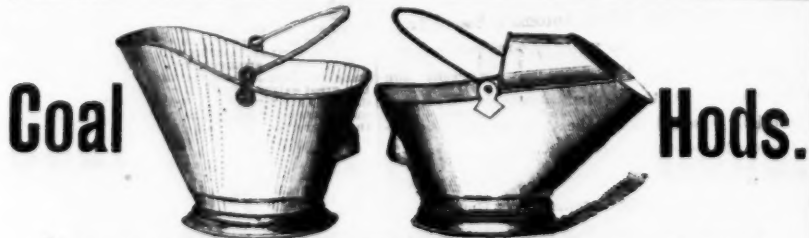
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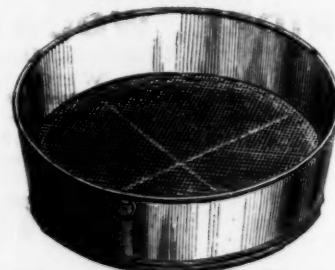
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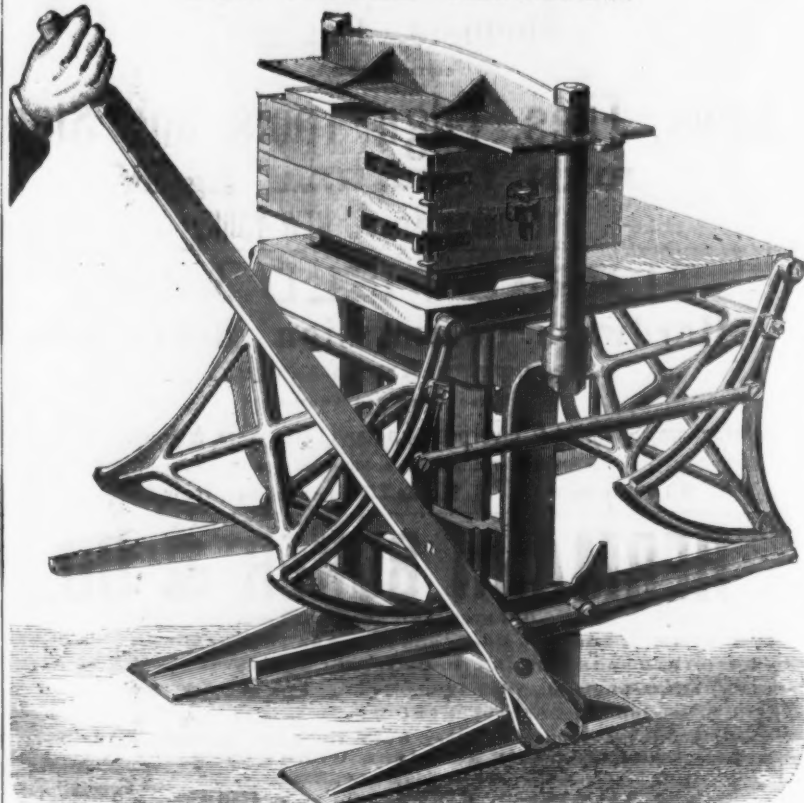
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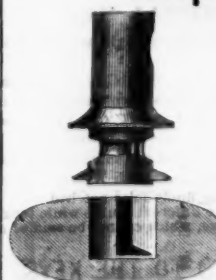
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Galvanized Iron.

No. 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000.

Russia Iron.

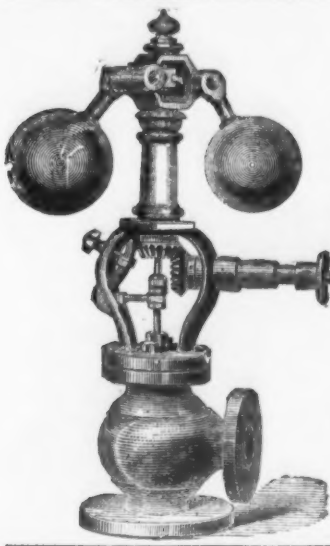
No. 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000.

American Russia.

No. 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000.

Sheet Iron.

No. 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288



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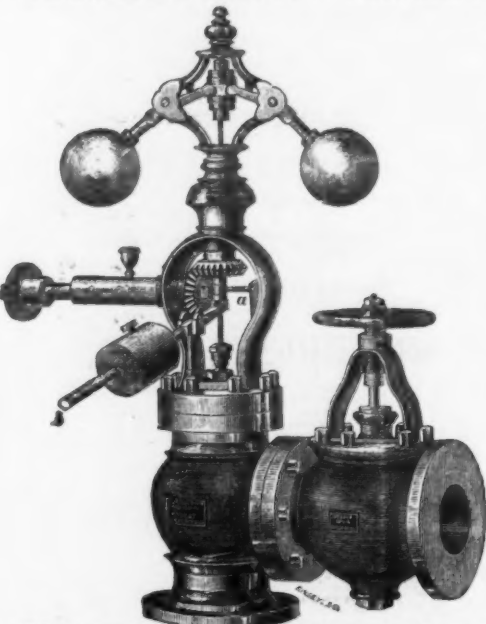
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Circulars sent free.

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Capacity of Valve or Diameter of Steam Pipe in inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment for altering speed.	Price of Stop Valve.
1/2	18 00	20 00	17 00
3/4	20 00	22 00	19 00
1	21 00	23 00	20 00	3 00	5 35
1 1/4	29 00	32 00	27 00	2 25	6 65
1 1/2	34 00	38 00	31 00	2 50	8 50
1 3/4	41 00	46 00	38 00	3 75	11 50
2	47 00	54 00	..	3 25	16 00
2 1/4	50 00	57 00	47 00	3 50	17 00
2 1/2	55 00	63 00	..	3 75	19 00
2 3/4	62 00	70 00	..	4 25	22 00
3	71 00	80 00	..	4 50	27 00
3 1/4	81 00	93 00	..	5 00	32 00
3 1/2	91 00	103 00	..	5 50	37 00
3 3/4	102 00	114 00	..	6 00	42 00
4	116 00	129 00	..	6 50	48 00
4 1/4	134 00	148 00	..	7 00	55 00
4 1/2	160 00	176 00	..	8 00	69 00
4 3/4	199 00	219 00	..	9 00	83 00
5	230 00	255 00	..	10 00	..

No Charge for Box and Cartage.

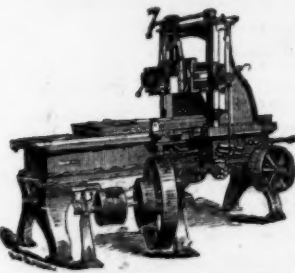
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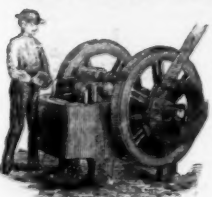
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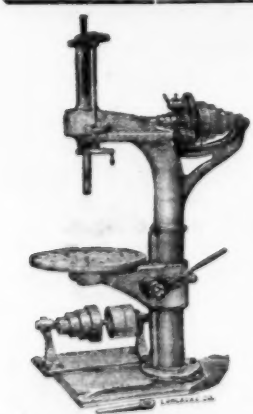
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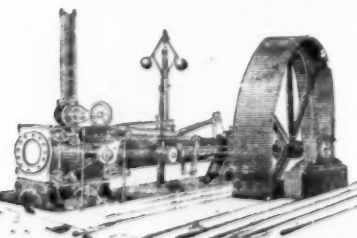
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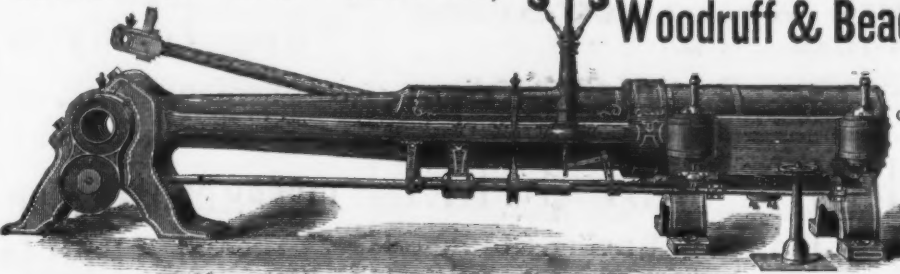
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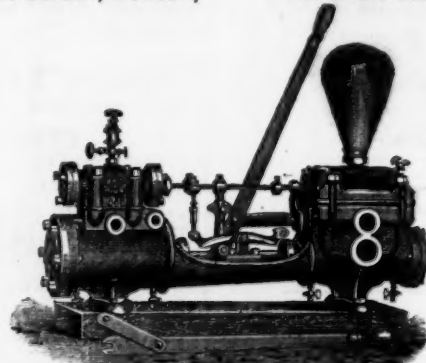
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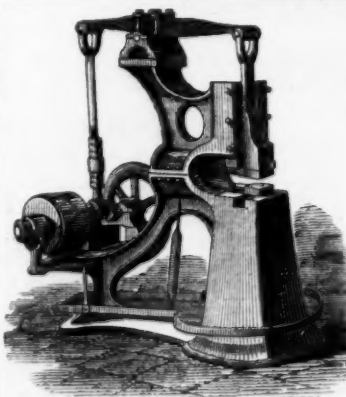
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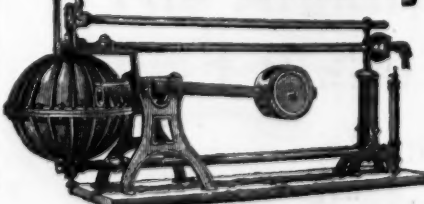


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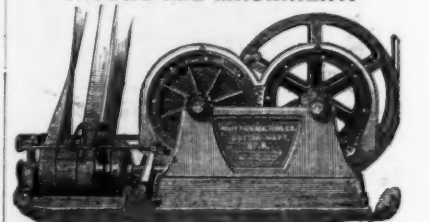
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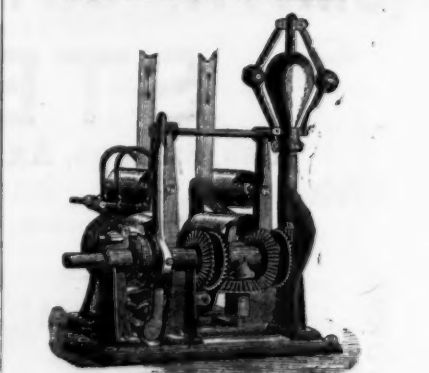
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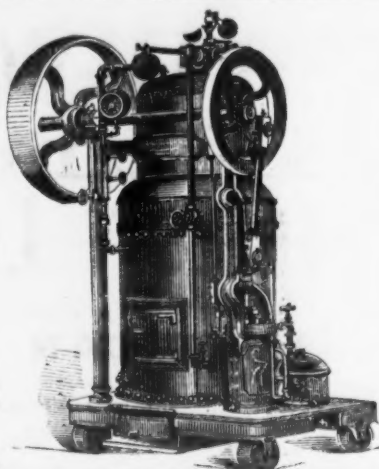
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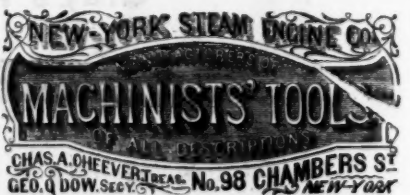
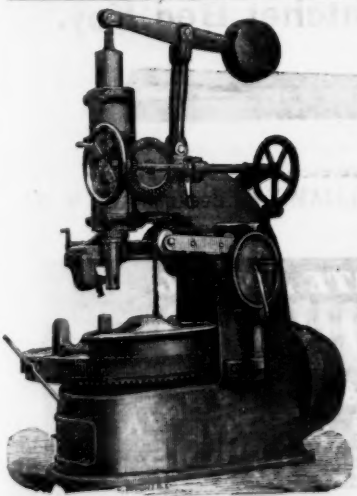
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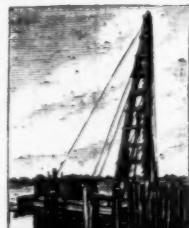
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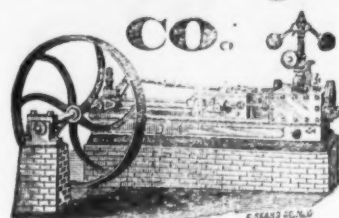
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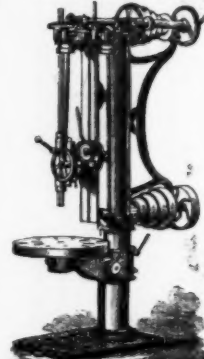
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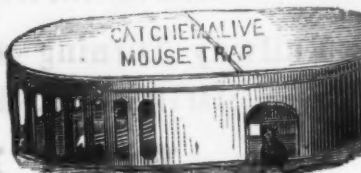
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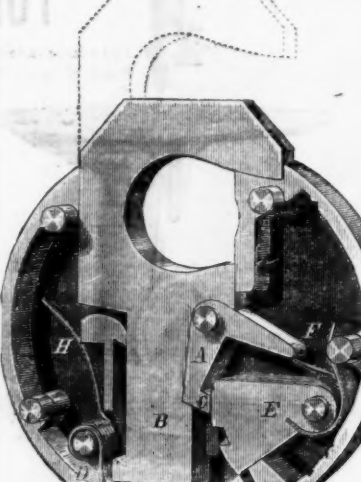


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